THE IRON AGE

New York, March 2, 1922

ESTABLISHED 1855 VOL. 109, No. 9

Open-Hearth Furnace Design

Calculations for Hearth Area, Depth of Metal, Incline of Parts and Velocity of Gases

BY A. D. WILLIAMS*

DESIGN computations for an open-hearth furnace do not require any large amount of mathematical knowledge, for the principles involved are comparatively simple. As in all other engineering and chemical propositions, it involves compromising a number of different requirements, and co-ordinating them in the right manner to secure a desired result. All elements of the problem are closely inter-related, and changes and modifications at one point necessitate carrying a corresponding modification through the entire system which it affects.

To establish a base for departure, it has been assumed that a furnace having a nominal capacity of 100 tons is to be built, that it is to be fired with producer gas and that the actual hearth area will be 650 sq. ft. The computations will be limited to those required to establish the design lines. Certain factors may be more or less arbitrarily fixed, without regard to current practice or whether they are desirable or not, merely for the purpose of furnishing a working base, the purpose of the computation being to illustrate the formulas used and their application.

Reactions in the open-hearth furnace are well known. Their main effect, as far as the flue gases are concerned, is an increase in CO_2 and the moisture content, the latter in the first part of the heat, and the former during the boil and after adding limestone. The fuel consumption will vary with the method of working

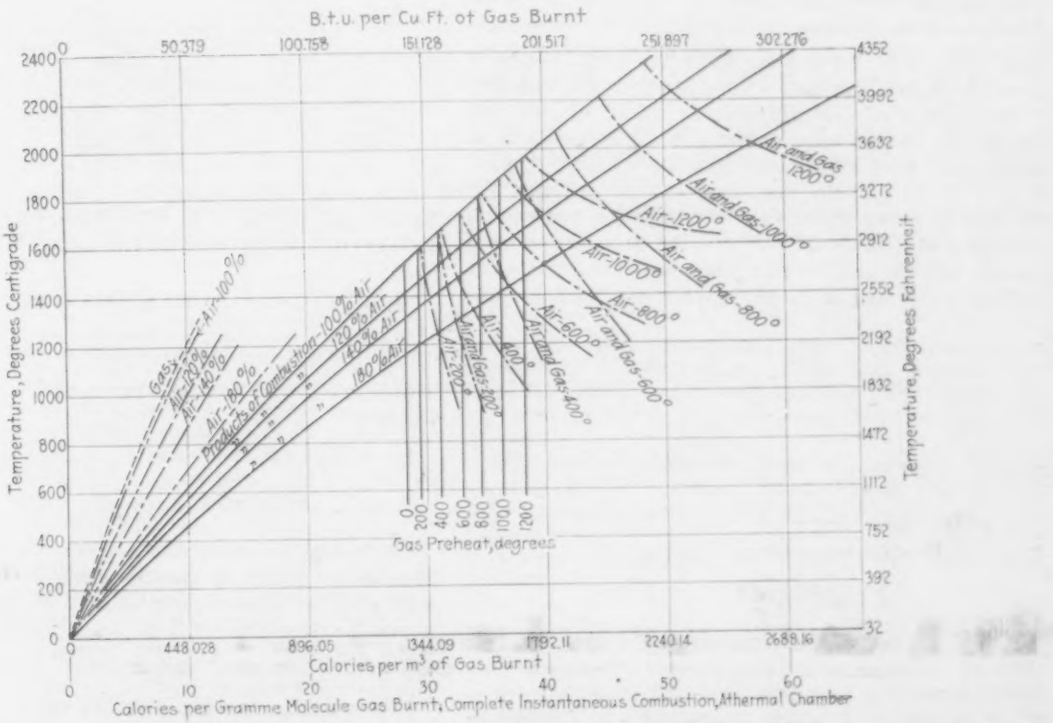


Fig. 1. Gas and Air Curves for Combustion with Varying Supply of Air

To establish a base for departure, it has been assumed that a furnace having a nominal capacity of 100 tons is to be built, that it is to be fired with producer gas and that the actual hearth area will be 650 sq. ft. The computations will be limited to those required to establish the design lines. Certain factors may be more or less arbitrarily fixed, without regard to current practice or whether they are desirable or not, merely for the purpose of furnishing a working base, the purpose of the furnace, etc., ranging from 485 lb. (220 kg.) per ton when using molten pig, up to 770 lb. (350 kg.) per ton and higher. The fuel consumption is not uniform during each furnace cycle, from charge to charge, but varies about as follows:

Percentage of Cycle (Time)	Percentage of Fuel Consumed
63.0	76.0
17.0	15.2
14.0	8.4
1.0	0.4
5.0	..
100.0	100.0

For the case in hand it is assumed that the fuel

*P. O. Box 92, Newark, N. J.

consumption will be about 660 lb. (300 kg.) per ton, converted into producer gas of the following percentage composition: H_2, 12.10; CH_4, 2.60; C_2H_4, 0.40; CO, 21.78; O_2, 0.02; CO_2, 5.68; H_2O, 3.82; N_2, 53.60; having a thermal value of 142 B.t.u. per cu. ft. (1261 calories per cu. m.) low value. The heat capacity of this gas, and the air supply required for its combustion and for the products of combustion, are shown by the curves, Fig. 1, which are similar to those shown on page 1225, THE IRON AGE, April 29, 1920. Table I gives the combustion and air supply data for this gas.

Table I—Combustion of Producer Gas

Volumetric Composition of Gas, Per Cent		B.t.u. Per Cu. Ft. of Element		B.t.u. Per 100 Cu. Ft. of Gas	Percentage of Gas Volume: O_2 Required	Products of Complete Combustion: CO_2	H_2O	N_2*
H_2	12.10	× 293.2	=	3,548	6.05	...	12.10	24.20
CH_4	2.60	× 983.4	=	2,557	5.20	2.60	2.60	20.80
C_2H_4	0.40	× 1,610.0	=	644	0.60	0.80	0.80	2.40
CO	21.78	× 343.6	=	7,484	10.89	21.78	...	43.56
O_2	0.02	....		....	—0.02	...	...	—0.08
CO_2	5.68	....		....	...	5.68	...	...
H_2O	3.82	....		....	...	...	3.82	...
N_2	53.60	....		....	...	...	...	53.60
	100.00			14,233	22.72	30.86	21.92	144.48

Theoretical air supply = 22.72 × 5.00 = 113.60 cu. ft. per 100 cu. ft. gas.

*Assuming atmosphere to consist of 80 per cent N_2 and 20 per cent O_2.

Air Supply Per Cent	Volume	Excess Air	Products of Combustion of 100 Volumes of Gas: O_2	CO_2	H_2O	N_2	Total
100	113.60	0.00	0.00	30.86	21.92	144.48	197.26
120	136.32	22.72	4.54	30.86	21.92	162.66	219.98
140	159.04	45.44	9.09	30.86	21.92	180.83	242.70
180	204.48	90.88	18.18	30.86	21.92	217.18	288.14

One pound of coal produces 70 cu. ft. of this gas, its specific weight being 0.07024 lb. The products of combustion, with 40 per cent excess air, weigh 0.08241 lb. per cu. ft. At the maximum rate of working, the gas will be burnt at the rate of 188 cu. ft. per second, requiring 300 cu. ft. of air, and the products of combustion will be 451 cu. ft. These are the volumes at 32 deg. Fahr. and 29.92 in. barometer. As the volumetric correction for pressure is comparatively small, it will be neglected in the computation, and temperature corrections alone used.

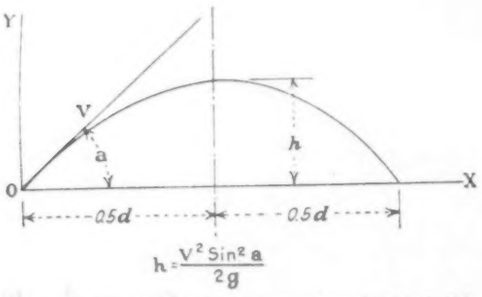


Fig. 2. The Parabolic Curve of an Inclined Jet

As the capacity of the furnace is to be 100 tons, the metal volume will be 523 cu. ft. With a hearth area fixed at 650 sq. ft., the approximate depth of the bath will be:

$$d = \frac{3v}{a} = \frac{3 \times 523}{650} = 2.41 \text{ ft.} = 29 \text{ in. of metal}$$

As the bottom will slope toward the tap hole, and be banked at both ends and sides, the actual maximum metal depth will depend upon the way this is done. As there will be at least 12 in. of bottom, the depth to the brick will be about 42 in. from the sills of the charging doors, and the port sill or bridge will be fixed 6 in. higher, making the total maximum depth that the flame must drop below the port, 48 in.

The brick lines of the hearth will have to be fixed outside of the bath area of 650 sq. ft. Therefore the inside width between walls will be made 16 ft. 5 in. (5 m. 00) and the length between port sills 44 ft. 3 in. (13 m. 50), giving an area of 726 sq. ft. (67 m. 50). If the length is cut to 42 ft. 8 in. (13 m. 00) the area will be reduced to 700 sq. ft. (65 m.² 00). Or the width might be reduced slightly by increasing the length. There are advantages in reducing the span of the roof, as well as disadvantages in making the furnace too long; but it is possible that a length of 46 ft. (14 m. 00), with a width of 15 ft. 3 in. (4 m. 650), giving an area of 701 sq. ft. (65 m.² 11), would be satisfactory.

The temperature in the heating chamber will be 3275 deg. (1800 deg. Cent.) for the gases, the roof being 100 to 200 deg. (55 to 110 deg. Cent.) cooler and the bath from 270 to 450 deg. (150 to 250 deg. Cent.) cooler. The height of the chamber may be approximated by Yesmann's formula:

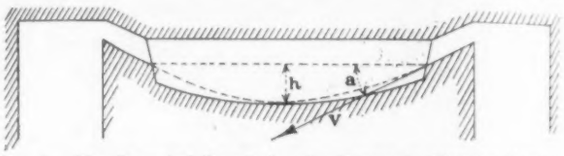


Fig. 3. The Inverted Parabola of a Flame in Making Bottom

$$h_t = A \sqrt[3]{\frac{Q_t^2}{B^2 t}}$$

In which,

h_t = the thickness in ft. of the moving gas layer;
Q_t = the volume of gas in cu. ft. at t deg. (Cent.) temperature;
B = the width of the furnace in ft.;
A = a coefficient which varies for each value of h_t and B in accordance with the following table:*

h_t	Values of B: 3 ft.	6 ft.	9 ft.	12 ft.	16 ft.
1 ft.....	2.275	2.36	2.4	2.42	2.43
1.5	2.215	2.32	2.38	2.4	2.41
2.0	2.15	2.28	2.35	2.38	2.39
2.5	2.08	2.245	2.32	2.36	2.38
3.0	2.01	2.2	2.3	2.35	2.375

The metric formula, together with many others used herein, will be found in "The Flow of Gases in Furnaces," by W. E. Groume-Grjimailo. For the case in hand:

$Q_t = Q_o (1 + \alpha t) = 451 \times 7.606 = 3430$ cu. ft. (= 97 m³ 14)
t = 3275 deg. Fahr. (= 1800 deg. Cent.)
B = 16.4 ft. = (5 m 00) or 15.25 ft. (4 m 650)
A = 2.37 and 2.34, approximately.

The formula may now be written with these values, as follows:

For B = 16.4 ft. h_t = 2.37 $\quad \sqrt[3]{\frac{(3430)^2}{(16.4)^2 \times 1800}} = 6.88$ ft.

For B = 15.25 ft. h_t = 2.34 $\quad \sqrt[3]{\frac{(3430)^2}{(15.25)^2 \times 1800}} = 7.11$ ft.

This will be the distance from the surface of the bath to the center of gravtiy of the roof segment. It will give an approximate height of the skewbacks, above the door sills, of 5 ft. 4 in. (1630 mm.) for the wider chamber, and 5 ft. 7 in. (1700 mm.) for the narrower chamber.

With a chamber area of 700 sq. ft. (65 m.²) the chamber volume will be approximately 5087 cu.ft. (144 m.³) for the wider chamber and 5280 cu. ft. (149 m.³ 50) for the narrower chamber. The gases will remain in the chamber approximately 1½ seconds, which, with a temperature drop of 360 deg. (200 deg. Cent.) per second means a temperature of approximately 2735 deg. (1500 deg. Cent.) for the gases leaving the chamber. Referring to the curve, Fig. 1, and allowing for a drop in calorific intensity of about 360 deg. (200 deg. Cent.) it will be seen that a preheat of the air and gas of between 1470 and 1830 deg. (800 and 1000 deg.

*Using metric units throughout, the table of values of A follows:

h_t	Values of B: 1.00 m.	2.00 m.	5.00 m.
0.3 m.	3.42	3.54	3.62
0.5	3.29	3.46	3.57
0.75	3.13	3.37	3.54
1.0	2.97	3.28	3.53

Cent.) will be required. Allowing for a possible loss of temperature in the necks, cinder pockets and uptakes, the checkerwork will be proportioned to supply a preheat of 2200 deg. (1200 deg. Cent.).

The distance the jet of flame must drop below the bridge or port sill, to permit the sintering of the bottom, has been fixed at 48 in. (1200 mm.). An assumed resultant velocity of the air and gas will fix the resultant angle of the two jets. The higher the assumed resultant velocity, the less the resultant angle will be, and the further beyond the center of the chamber the point of maximum depression of the jet of flame.

High velocities, in addition, cause the incoming end of the chamber to work cold and the outgoing end to work hot, while the desirable condition is that both ends of the chambers shall work, as nearly as possible, uniformly. High velocities for either the gas or the air mean reduced port areas, and high velocities for the outgoing products of combustion, which in turn call for an increased draft depression to pull the gases through the ports. This draft depression creates a suction acting to pull air in through the valves, flues and chamber walls. At the same time, it is necessary to have sufficient draft to draw the waste gases out of the chamber and down through the checkerwork, but the lower this draft depression, the less the tendency to induce air leakage or infiltration.

As the flame has to drop 48 in. in one-half the 46-ft. (14 m. 00) length of the furnace, an angle somewhat greater than 10 deg. must be allowed for the trajectory of the jet. Yesmann's formula for this case is:

$$H = \frac{v^2 \sin^2 a}{2g} \times \frac{459 + t_i}{t_m - t_i}$$

In which,

H = the middle ordinate of the parabola, in this case 4 ft.;
v = the resultant velocity of the two jets uniting to form the flame;
$\sin a$ = the sine of the resultant angle of the two jets;
$2g$ = gravitational constant = $2 \times 32.2 = 64.4$;
t_i = the temperature of the gases within the chamber;
t_m = the temperature of the gases in the jet.

When a furnace is heating up, the stream of flame tends to follow the roof until the interior of the chamber becomes raised to a temperature sufficient to permit it to drop, and the drop of the flame is an index of the progress made in heating the furnace. It is likewise desirable to be able to sinter the bottom, when the furnace for any reason may be cooler than usual, or the ports eroded. The temperature of the jet of flame, t_m, may be assumed as 3275 deg. (1800 deg. Cent.) and the gases in the chamber as 1475 deg. (800 deg. Cent.) $= t_i$. Velocities of $v = 50$, 65 and 80 ft. (15, 20 and 25 meters) per second, tried out in the formula and solving for $\sin a$, give a resultant angle as follows:

For $v = 50$ ft. per second $a = 18° 34'$
$v = 65$ ft. per second $a = 14° 11'$
$v = 80$ ft. per second $a = 11° 29'$

In solving to obtain these angles:

$$t_i = 1475$$
$$459 + t_i = 1834$$
$$t_m - t_i = 3275 - 1475 = 1800$$
$$H = 4 \qquad 2g = 2 \times 32.2 = 64.4$$

The formula can now be written:

$$H = 4 = \frac{v^2 \sin^2 a \times 1834}{64.4 \times 1800}$$

which becomes

$$\sin a = \sqrt{\frac{253.5}{v^2}} = \frac{15.92}{v}$$

For $v = 50$ ft. per sec., $\sin a = 0.3184$
For $v = 65$ ft. per sec., $\sin a = 0.2449$
For $v = 80$ ft. per sec., $\sin a = 0.1990$

Should t_i be given a higher value than 1475 deg. (800 deg. Cent.) the angle will be less. Two components may be selected to suit the resultant angle and velocity, but this cannot be intelligently done until the pressures available for impressing velocity upon both the gas and the air have been approximated. For the air, the pressure available will be entirely due to the chimney effect of the system, diminished by the resistance to the flow of the air, unless a fan is used. The same pressure is available, in the case of the gas, plus the pressure in the gas main, which is more or less under control through the steam blower on the producer. To determine this chimney effect, it is necessary to arrive at the regenerator height.

Industrial Conditions in Belgium

WASHINGTON, Feb. 28.—The revival of Belgian industries during the last quarter of 1921 was largely artificial, being caused by a combination of temporary factors, especially the decline of German competition, says Acting Commercial Attache Cross in a cable to the Department of Commerce. Since Jan. 1 this improvement has been abruptly checked, especially in the window glass, coal and metallurgical industries. The rise in French exchange, price reductions on British coal, iron and steel, and American window glass, have been chiefly responsible for the reaction, and Belgian manufacturers are finding drastic measures necessary in meeting foreign competition. Wage reductions are under negotiation in the coal mines and window glass plants. Coal prices have been cut from 6 to 10 francs per ton to meet the British competition, and price reductions in window glass are being considered to meet the American cuts. Colliery stocks are increasing, and the tendency toward the combination of coal mines and purchase of collieries by metallurgical interests is continuing. Coke production has been greatly stimulated by the foreign demand and all ovens are working to capacity.

On Feb. 1, 18 blast furnaces were operating as compared with 15 a month previous. These are now producing 646 tons of foundry iron and 2470 tons of basic pig per 24 hours. The increased production has resulted in a marked price reduction which has been further hastened by the low British quotations which have occurred in all metallurgical lines during the past three weeks, representing decreases ranging from 10 francs per ton on pig iron to 50 francs on billets and sheet bars. Belgian prices of open-hearth steel generally are down 1 franc per kilo. From the Belgian standpoint, further reductions are both probable and essential, owing to the persistent low offers of British pig iron and semi-finished productions in the local centers.

The Sambre et Moselle works have recently received an order for 40,000 tons of rails from Argentina, and Brazil has placed an order for 32,000 tons with the Usines de la Providence. Other important rail orders have been received from Holland and Bulgaria.

Corporations Granted Extension of Time

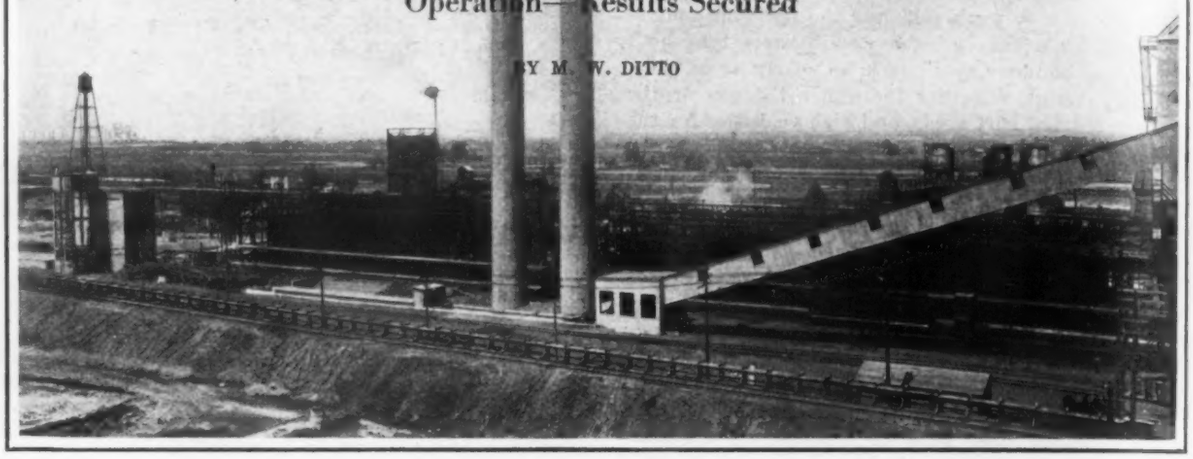
WASHINGTON, Feb. 28.—Commissioner of Internal Revenue Blair has granted a general extension of time to domestic corporations for completing returns of income for the calendar year 1921, the fiscal year ended Jan. 31, 1922, and the fiscal year ending Feb. 28, 1922. The extension is conditional upon the filing of tentative returns with the Collector of Internal Revenue on or before March 15, April 15 and May 15, 1922, respectively, accompanied with at least one-fourth of the estimated amount of tax due, together with a statement setting forth the reason why the return cannot be completed within the prescribed time, and a formal request for the extension.

This permission was granted on the plea of corporations which insisted that it was a physical impossibility to make the returns on the date required in the revenue act of 1921. The tentative returns must be so labeled and only the name and address of the taxpayer and the estimated amount, if any, of the tax due need be stated. The law provides for a levy of 6 per cent in the event of a deficiency in the first instalment.

Roberts Type of By-Product Coke Ovens

Granite City Batteries Produce Metallurgical Coke from Illinois and Indiana Coals—Design and Operation—Results Secured

BY M. W. DITTO



Editor's Note: The successful production of metallurgical coke from the high volatile coals of the Illinois and Indiana fields has long been regarded as impossible. Yet by-product ovens, designed for that very purpose, have been in operation for a year. The blast furnace of the new plant of the St. Louis Coke & Chemical Co., Granite City, Ill., was described in an illustrated article in THE IRON AGE *of Jan. 6, 1921. The first published description of the Roberts type coke ovens of that company is appended below. The author is consulting engineer of the St. Louis Coke & Chemical Co., and also of the American Coke & Chemical Co., of which the former is a subsidiary. The outstanding difference between the Roberts oven, as constructed at Granite City, and other by product installations lies in the baffled structure of the wall, which permits the heat to be absorbed from the heating gases in the combustion chamber at a higher rate than in the flue type of oven. The heating walls are always maintained at a temperature above the heat requirements of the coal, eliminating the variation in temperature resulting from heat absorption by fresh coal, and thereby preventing the volatilization of the binding elements.*

PIG iron was produced in and about St. Louis in some quantity before it was produced in the Chicago district and other places that have since become famous as iron producing centers. What pig iron was produced in this district was mostly from native Missouri ore with charcoal as fuel. The production of iron gradually decreased, however, as other producing centers, such as Pittsburgh, the Valley district and Chicago, grew up, until it ceased entirely. In the meantime St. Louis became one of the largest iron melting towns in the United States, and depended entirely upon iron shipped in from other districts.

In view of the fact that St. Louis was contiguous to one of the largest coal deposits in the world, and that freight rates on ore were on an equitable basis with other iron producing points, there seemed to be only one thing that prevented St. Louis from becoming a permanent iron producing center, and that was the inability to utilize the coals contiguous to it. Previous to the time that the Steel Corporation was formed, John W. Gates and Levi Z. Leiter of Chicago became interested in the production of coke from these coals on a large scale. Mr. Leiter carried out some early experiments that indicated that it was possible to use these coals if apparatus that could be economically operated could be devised. Unfortunately Mr. Leiter died before the conclusion of his earlier plans, and the development work on the use of Illinois coal for the production of metallurgical coke lay dormant for several years.

Development work was undertaken again, however, and finally concentrated itself around the organization built up by Arthur Roberts of Chicago and his associates, and crystallized in the construction of the St. Louis Coke & Chemical Co. plant at Granite City, Ill. This plant was completed and put into operation in January, 1921. It consists of one 500-ton blast furnace, designed by Freyn, Brassert & Co., Chicago, and 80 Roberts by-product coke ovens, arranged in two batteries of 40 each.

The furnace is of standard design of the following dimensions: Height, 86 ft.; hearth, 17 ft.; bosh, 20 ft. 6 in.; bosh angle, 80 deg. 5 min. The furnace has been successfully operated since its installation on coke made from Illinois and Indiana coal. It is operated in conjunction with the National Enameling & Stamping Co., which has ten open-hearth furnaces and produces practically all of the steel used in its enameling and stamping departments. The iron is transmitted from the furnace to the open-hearth furnaces in the hot metal form in Treadwell ladles, and the furnaces are heated with coke oven gas and tar.

As it is anticipated that the successful coking of Illinois coals will lead to great expansion of the steel industry in the St. Louis district, the plant at Granite City was laid out for an ultimate daily capacity of 3000 tons of pig iron and 8000 tons of coal, consisting of six blast furnaces and 320 ovens. The initial installation is so arranged that the two units closest together are now built, and the extensions will be made in both direction from these units.

As stated, the coke ovens are arranged in two bat-

teries of 40 ovens each, supplied from one coal storage bin having a capacity of 1900 tons. All of the equipment of the coke oven plant is standard, the only peculiarity of the plant being the design of the coke ovens themselves.

Before building this plant, the only installation of Roberts ovens that was used for producing coke from high volatile coal for blast furnace purposes was a group of 24 at Dover, Ohio, in conjunction with the M. A. Hanna Co. furnace there. The practice established at that point was the basis for the Granite City design. The Dover ovens used the common regenerators for preheating the air, similar to the old Otto-Hoffman type, but aside from the regenerative feature the ovens are practically the same as in St. Louis.

Considerable interest was created when it was announced that the Granite City ovens were to be equipped with recuperators made of silica brick and covering the entire space underneath the ovens, similar to the individual regenerative type of oven. A brief description of the ovens will clearly show how the design differs from what has been known as common practice in coke oven construction up to the present time.

Construction features of the oven are shown clearly in the skeletonized model view. It will be noted that the recuperators are divided into two individual independent sections, and occupying all of the space underneath the ovens with the exception of the dividing wall. The waste gases make two passes in each of these sections and each section is made up of 16 flues of 4 tiers each. The gases pass through the flues, and the air flows countercurrent upward on the outside of the flues. The entire recuperator is constructed of silica brick.

Each oven has a capacity of 600 cu. ft. of coal, and an average width of 14 in. The coal is charged within one foot of the top of the coke oven chamber, through five charging holes. The products of distillation are taken off on the pusher side through a single ascension pipe, and both batteries are equipped with duplex foul gas mains, so that the gas can be separated. All of the fuel gas is introduced at the top of the oven, the primary gas being introduced at a point about 12 in. below the coal line, and the secondary, half way down the wall.

The primary and secondary gas headers or manifolds at the top are independent. These headers are rectangular in shape, with a partition in the center, one side being for the primary gas and the other side for the secondary. The primary gas goes through a 4-in. hole lined with fire clay tile, having a ¾-in. hole in it.

Air coming out of the top of the recuperators rises through the center wall to practically the top of the coke oven chamber. There it is transferred across the wall and passes down through ports on each side of the port through which the primary gas is introduced. All of the air is introduced at this point and our common practice is to introduce only 50 to 60 per cent of the gas required for the carbonizing of the coal at the orifices of the primary gas. The balance of the gas enters through the secondary ports, which are reached by ducts coming from the top of the wall through the center wall, and enters the combustion chamber through inclined slots in the side of the brick.

All of the products of combustion, accumulating in the upper sole flue, are allowed to go through ports, regulated by slide brick, into the lower sole flue, where they are all brought to the end of the oven and thence downward to the first pass into the top of the recuperator. After passing through the lower section of the recuperator they are discharged into the waste gas offtakes, in which a butterfly valve is inserted to regulate the draft on each oven.

There are seven ducts in the concrete foundation supporting the oven structure. The air comes into these ducts from the ends of the foundations at both extremities of the battery, and passes through the ports on top of the first course of fire clay brick into the base of the recuperator. These ports have cast iron slide dampers over them to regulate the quantity of air. This has proved a very satisfactory way of introducing the air, because we have been able to maintain the concrete work underneath the ovens at practically atmospheric temperature, so that there have been no expansion problems involved in that part of the installation.

In designing this oven the principal things we kept in mind were the fact that we wished to produce a large tonnage of coke, per dollar invested in the plant, and to simplify the operation of the ovens to as high a degree as possible. Therefore, there are no points in the oven where regulation of both air and gas or products of combustion is dependent upon a combination of regulator dampers. The draft is regulated by the butterfly valve in the waste gas offtakes. The distribution of the draft is regulated by the slide brick on the ports at the bottom of the upper sole flue.

The amount of air going to each primary burner is regulated by the slide brick at the top of the wall, and the amount of gas passing into the wall at any one

Coke Being Pushed into the Receiving Car

point is regulated by the adjustment of the cocks coming off of the distribution manifolds along the top of the oven. The gas is regulated by drilling a predetermined size hole in the plug that goes into each individual cock. These holes vary in size according to the width of the oven, and the quantity of gas that each oven gets is determined by the pressure carried upon the main header, based upon the well-known fact that a given quantity of gas at constant pressure will flow through a given size orifice in a unit of time.

To vary the quantity of gas being burned per unit of time requires merely the changing of the pressure on the main headers, which is done by setting a governor instead of changing the sizes of the orifices in the individual cocks. After having determined the quantity of gas required for a given coking time and having placed the proper size orifice in the cocks, the only function of the heater from that time on is inspection of burners to see that they do not become clogged.

The secondary gas is regulated in the same way. On the ends of the gas manifolds there is an auxiliary pipe connection coming from a separate header, in which air at 1 lb. pressure is supplied by an ordinary high-speed blower.

Our practice is to cut off the gas entering the secondary gas ducts every 6 or 8 hr., and allow the air at 1 lb. pressure to pass through them. In this space of time there will be from 1/16 to ⅛ in. of carbon formed on the walls of the duct, which is 1½ in. in diameter. As this carbon is red hot the admittance of air into the duct starts combustion immediately, and in the space of from 10 to 15 min. the carbon is all burned out. We do not consider that there is any heat loss from this, because observation shows that the temperature of these ducts is hotter at the end of the decarbonization period than at the beginning, and the products of combustion resulting from burning the carbon are hot enough so that there is no deleterious effect upon the heating conditions in the lower part of the wall.

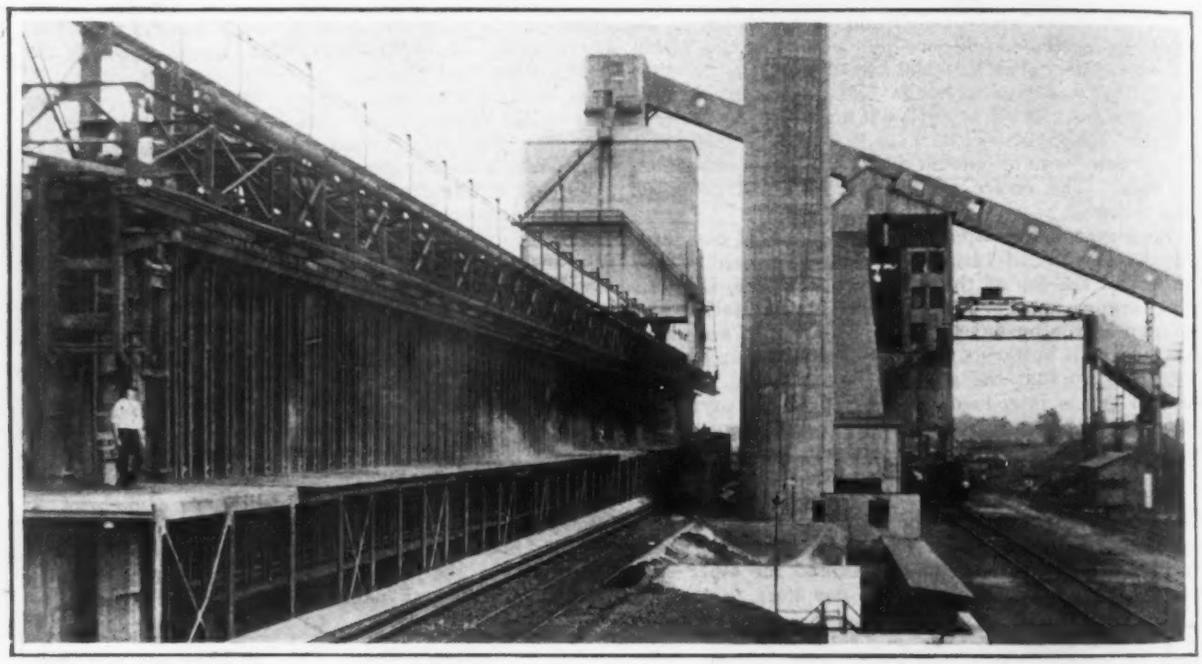
As a result of this practice, we have had no trouble from introducing the gas through the secondary gas ducts, and, by the arrangement used, it requires very little of the heater's time, the only important thing being that this operation is carried on regularly at stated intervals.

The benzol equipment has not yet been installed at this plant, and we are using the lean gas for fuel without the benzol being taken out. Our experience showed at Dover that, when the gas was debenzolized, it was not necessary to decarbonize these ducts more than once every two or three days. So the question that naturally arises as to the relative value of introducing gas into a coke oven wall at more than one point in its elevation does not present any operating difficulties, and in our opinion the advantages gained by these means are worthy of serious consideration.

The height of the walls of the Roberts oven is 13 ft. 9 in. The ordinary lean coke oven gas running high in hydrogen necessarily burns with short flame. Hence by using the method of distributing and burning the gas described, we have no difficulty in maintaining a uniform temperature on the high wall, thereby getting the benefit of the greater tonnage with narrower coke oven chambers.

The brick work in the coke oven wall is of standard Roberts type, making a combustion chamber that is intercommunicating throughout its entire length, with the exception of the baffles, partially isolating the three end burners. These baffles are put in to make it possible, by draft regulation, to compensate for the extra heat required to keep the ends at the same temperature as the balance of the wall.

The action of the gas being introduced into a coke oven wall of this type is interesting. It has always been assumed that, by satisfying the given quantity of gas with all of the air necessary to burn it, this would localize the heat at the point of combustion. This is not entirely true, according to our practice, because of the fact that only 50 per cent of the gas is introduced at the point where all of the air comes in.



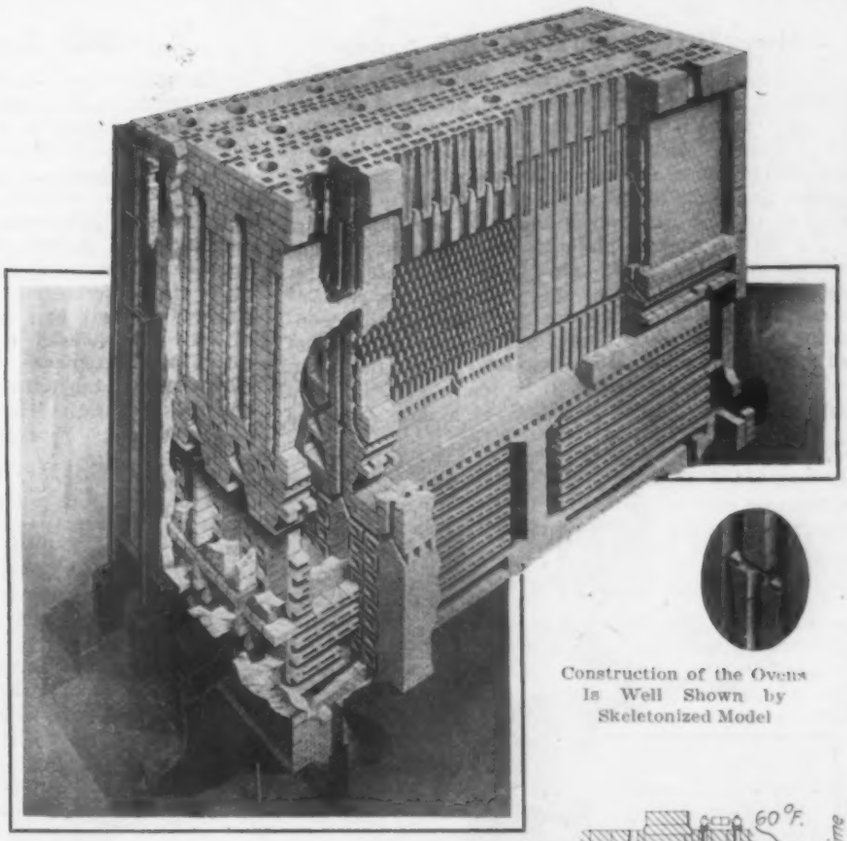
Coke Discharge Side of Ovens

As it is necessary to raise the excess of the 50 per cent of air up to flame temperature, the latter is reduced or tempered by the excess air; and as the point where the air and gas first meet is a mixing chamber, which might be termed a short flue, the rate of heat extraction is lower than it is further down in the wall. There is no question that by interrupting the flow of gas, as in this type of wall, the rate of extraction of heat from the flame is higher than in a flue structure.

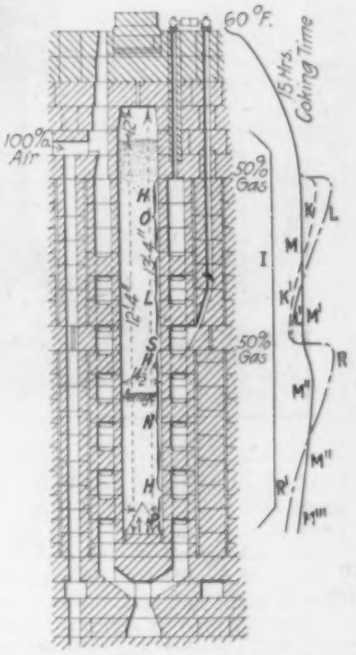
When we come to the point where the secondary gas is introduced, it mixes with the products of combustion resulting from the primary introduction, and the air at that point is diluted to such an extent that the rate of combustion is materially slowed down.

All of this gas passes through the section of the wall in which it is being constantly impeded by that part of the brick which crosses the combustion chamber. We have found it to be an arbitrary problem whether either the top or the bottom of the coke oven wall should be carried at a uniform temperature, or hotter or cooler; and it is our practice to carry the bottoms a little hotter than the top, particularly on the fast coking times.

Plan of the Brick Forming the Baffled Structure of the Heating Wall, Being a Section Through the Heating Wall and Combustion Chamber



Construction of the Ovens Is Well Shown by Skeletonized Model



In This Section Are Shown Corresponding Curves Representing (*I*) the Ideal Condition with Heat Transferred to the Coal at Uniform Rate through Entire Height of Oven; (*M*) the Heat Effect Actually Present in Roberts Wall; (*K*, *L* and *R*) Theoretical Extremes to Which the Gases Would Go if Not Influenced by the Conditions Existing in the Oven

The comparison of the function of this wall with similar problems in heat disposal or absorption is often made with the air cooled gasoline motor. In this instance fins are cast upon the walls of the engine cylinder to dispose more rapidly of the heat, as it is absorbed by the inner surface of the wall. In the Roberts coke oven this condition is reversed, that is, we might say the fins are cast on the inside of a cylinder wall and act as heat absorbing elements instead of heat disposing elements.

By likening the checker brick combustion chamber to the fins on the engine cylinder, with the fins exposed to the heating gases, there is a more rapid absorption of heat than if the walls were smooth. While this analogy is not an entire measure of the function of this type of construction, it is a comparison that is interesting.

The oven was designed to have a waste gas temperature of 750 deg. Fahr. at the point where it left the lower pass of the recuperator, when operating the ovens at 15 hr. coking time. The operation of the plant has proved the figures on which we based these calculations to be accurate, and when operating at the slower coking time the waste gas temperatures run very much lower; that is, when operating on 18 to 22 hr. coking time, the waste gas temperatures are from 350 to 400 deg. Fahr., and by the same token, when operating at 12 to 13 and 14 hr. coking time, the waste gas temperatures go up to 850 deg. Fahr.

As this was the first installation utilizing a recuperator of this type, it was not our desire to seek the maximum gas economy, as there were some unknown factors that had to be worked out before the design could be adopted as standard. We now have that information, and feel that it will be possible to build an oven according to this design as economical in gas consumption as any regenerative oven that has been designed or put in operation to date.

When operating at the normal coking time of 15 hr., the air leaving the top of the recuperator is heated to a temperature of from 1670 to 2000 deg. Fahr. As this air passes up through the brick work between the two heating walls, it also increases in temperature to that of the brick through which it passes, increasing from 100 to 250 deg. Fahr., depending upon the operating conditions.

This heat is not lost, however, because it is a closed cycle and is going back to the heating wall on its return with new products of combustion; so that there is a continuous flow of heat of uniform temperature, which is the reversed condition of a reversing type of regenerator, and the average overall efficiency is just as high as could be secured with a regenerative design.

The oven is supported on two 18-in. silica brick walls that are corbelled in at the top to bridge over the top of the recuperator, so that the expansion of the recuperator can be taken care of independently of the oven structure. If, in the future, it is found necessary to reset the brick in this section of the oven, this can be done without interfering with the upper part of the structure.

There are independent buckstays on the bulkheads forming the insulating brick in front of the recuperators, controlled by screws from the main buckstays, so that the position of these small buckstays can be placed at the required point, regardless of where the main buckstays go.

The question of the difference in expansion between

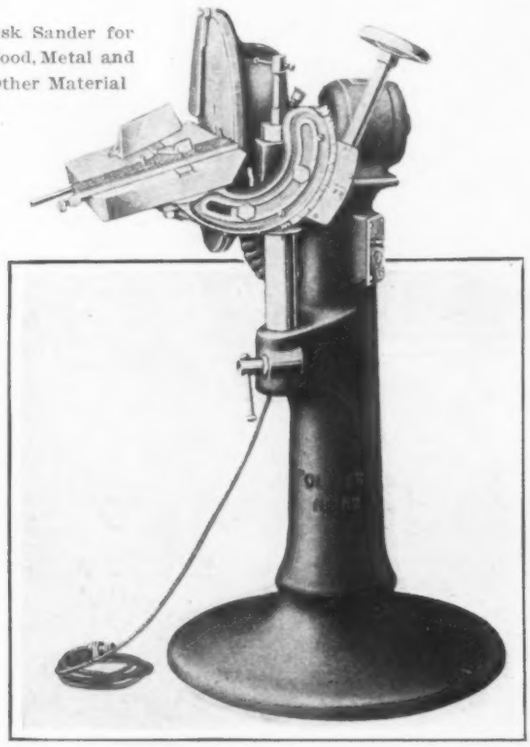
(*Continued on page* 624)

Motor-Driven Portable Disk Sander

A 15-in. motor-driven, portable disk sander for use in pattern shops and wood-working plants in general has been brought out by the Oliver Machinery Co., Grand Rapids, Mich. It is suitable also for sanding hard rubber, fiber, leather, and in machine shops, for medium and light metal work. The machine is designated as the No. 182 and is shown in the illustration.

The disk is a steel plate 15 in. in diameter and is mounted on a disk shaft hub. It is removable for renewing sand paper. The speed of the disk is 1725 r.p.m. The disk head is a one-piece iron casting, containing the disk, disk shaft, ball-bearing end thrust and exhaust fan and system, forming one complete unit.

The table is 9¼ in. wide, 21 in. long and 37 in. from floor. It can be tilted 45 deg. down or 25 deg. up by the



Disk Sander for Wood, Metal and Other Material

hand wheel shown, a graduated index being provided to show the exact angle of tilt. The table has a 6-in. vertical adjustment and can be swung to the right to permit taking off of the disk. The angle gage, operating in the table slot, is graduated from 0 to 45 deg., both to right and left, for accurate setting.

The machine is equipped with a combination gage to enable circular, segment and duplicating work to be done. This gage consists of a plate with a hinged strip pivoted to the bottom, which rides in a slot on the table. The plate has a series of holes to take center pins for circular work and the fence part of the angle gage for duplicating work. There is also a stop gage and segment pin for segment sanding which is operated by a handle cast to the plate. An adjusting screw acts as a stop or set for amount of cut to be taken.

The motor is single, 2 or 3 phase, 60 cycle, 110 or 220 volt alternating current or 110 or 220 volts direct current, coupled to the disk shaft. A 25, 30, 40 or 50 cycle motor can be provided at extra cost. The motor runs in ball bearings and rotates the disk shaft, but does not take load of thrust. A plug connector permits of attachment to any light socket. The switch is of the push button type, located as shown.

Circular work up to 15 in. in diameter and duplicating work up to 7 in. wide can be handled. Garnet-paper disks are provided for wood sanding and aloxite or emery-cloth disks for metal grinding and polishing. The exhaust system deposits the dust within the column. The weight crated is 400 lb.

Blast Furnace Activities

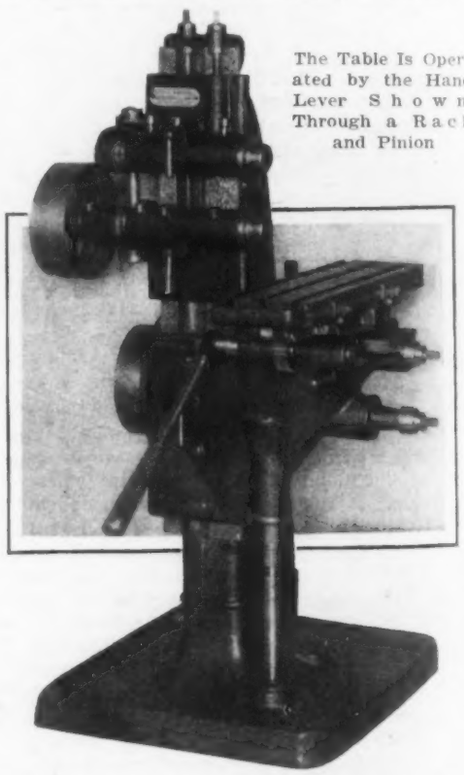
Carnegie Steel Co. now is operating 28 of its 59 blast furnaces, 27 on pig iron and one on spiegeleisen. The latest addition to the active list is one of the three stacks at the Clairton works, all of which have been down for about a year, and one at Duquesne works. One of the Lucy furnaces which has been making Bessemer iron will soon go on to ferromanganese. LaBelle Iron Works recently started up its second furnace at Steubenville, Ohio, and the furnace of the Wheeling Steel & Iron Co. at Martins Ferry, Ohio, will be blown in before long. The number of active furnaces in the territory bounded by Johnstown, Pa., Portsmouth, Ohio, and Warren, Ohio, now is 60 out of a total of 140. Only five merchant furnaces and 25 steel stacks are in blast.

Duplex Hand Milling Machine

A duplex hand milling machine for slitting piston rings of the step type has been placed on the market recently by the Superior Machine & Engineering Co., Detroit. It is also intended for use in sawing apart babbitt-lined bearings for automobile crank shafts and for milling two keyways or slots at the same time or any similar operation.

The grinding surfaces are long in proportion to their width, which enables the slides to move freely without cramping. Sliding members can be clamped in position without disturbing the adjustment of the gibs.

The machine is driven directly from the line shaft, but can be arranged for motor drive, in which case a



The Table Is Operated by the Hand Lever Shown, Through a Rack and Pinion

1½-hp. motor is mounted on a bracket at the base of the machine. On the end of the main-driving shaft there is a change pulley which is belted to an upper pulley mounted on the lower spindle, as shown in the accompanying illustration. The drive to the upper spindle is through helical gears and a vertical shaft. The helical gears are hardened and run in oil. The spindles are of high-carbon steel and run in bronze bearings.

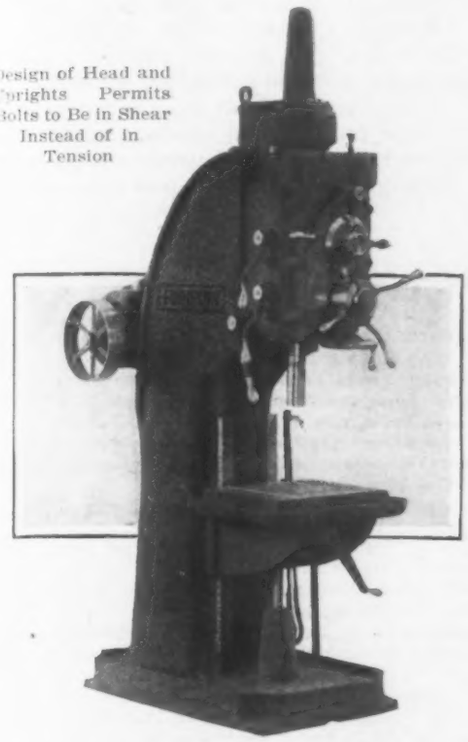
Graduated dials are provided on all adjusting screws. The table is operated by the hand lever, shown, through a rack and pinion. The machine weighs approximately 900 lb.

Dilworth, Porter & Co., Pittsburgh, maker of spikes and track equipment, plant of which has been idle for several weeks, resumed operations Feb. 27.

New High-Duty Drilling Machine

A new 20-in. high-duty drilling machine having a capacity for driving a 1½-in. high-speed drill through steel has been brought out by the Foote-Burt Co., Cleveland. It is designated as the No. 23, and was designed to take the place of the former machine bearing the same number.

The machine is shown in the accompanying illustration. The features include simplicity in general design, there being no loose brackets or other bolted-on



Design of Head and Uprights Permits Bolts to Be in Shear Instead of in Tension

parts, and in the interior mechanism, which has resulted in the elimination of many parts. All parts are readily accessible for inspection and adjustment. The use of a telescoping screw under the table is also eliminated, the single screw provided permitting vertical table adjustment of 12 in. without the necessity of providing a hole in the floor. Control is centralized, all operating levers being within easy reach from the operator's working position in front of the machine.

The design of the head and column permits bolts to be in shear instead of in tension. Bending stresses due to high-drilling pressures are taken up by the rigid upright, which is also reinforced by the head. It is claimed that this method of construction is better suited to the modern practice of using high speeds and heavy feeds than a design in which the upright is split horizontally at the point of maximum stress. The base, upright and jack-screw support are all cast integral, which is intended to add to the rigidity of the machine.

The drive is by a single pulley through a friction clutch, no counter shaft being required. Nine spindle speeds from 75 to 610 r.p.m. are provided, and three geared feeds, 0.006, 0.012 and 0.026 in. per revolution of the spindle. Speed and feed changes are made through sliding gears, no clutches or sliding keys being used. Helical gears are used for driving the spindle, transmitting power to the tool evenly and smoothly. Speed and feed change gears are of heat-treated steel. The machine has the "Footeburt" double rack feed to the spindle intended to eliminate side friction on the spindle sleeve. The spindle is counterbalanced by a weight. The driving-shaft bearings are Hyatt or taper roller bearings, Hyatt bearings being used for radial loads and the taper roller being for the combined radial and thrust load. Heavy ball-bearing takes the thrust of the spindle.

All parts of the feeding and driving mechanism are entirely inclosed. The speed change gears run in an oil bath and the feed gears are lubricated by a positive-splash oil system. The upper driving helical gears and other bearings are packed in grease, a sufficient supply being stored in caps to last several months. A gear-driven pump is provided for cutting compound.

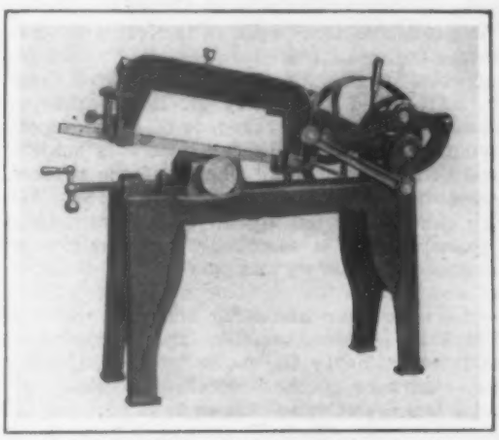
The principal dimensions are as follows: Center of spindle to face of column, 10 in.; nose of spindle to top of table, 28⅝ in.; length of power feed, 12 in.; Morse taper No. 4; working surface of table, 20 x 16 in.; vertical adjustment of table, 12 in.; face of square locking table bearing on column, 10 in.; length of square locking bearing on table, 12 in. The net weight is 2700 lb.

Hacksaw Machine Using Light-Gage Blades at High Speed

A metal-cutting machine for medium-duty work, incorporating the positive draw-cut principle and designed to use light-gage blades at high speeds, has been added to the line of the Racine Tool & Machine Co., Racine, Wis. It is known as the Racine Junior and is a moderately priced machine intended for the average shop. A production approximately double that usually obtained is claimed.

The use of light-gage blades is permitted because of the automatic-lifting device incorporated. The lift is positive and takes place on the non-cutting stroke, giving free clearance to the blade on the back stroke, under all pressures. This is said to eliminate drag back, heating, bending and binding in the cut, effectively preventing quick wearing off of the teeth of the blade.

The feed is by gravity. An automatic knockout is provided to stop the saw when the cut is finished. The saw-frame guide holds itself automatically at any height and adjustment for wear is provided. The frame slides on V-ways, giving maximum bearing surface. The machine is designed to take stock 4 by 4 in., although by simple adjustment stock up to 6 by 6 in. can be handled.



Right Hand View, Showing Cutting Position

The speed is given as from 60 to 100 r.p.m. and the stroke 6 in. The floor space occupied is 38 by 12 in. The height to top of the table is 20 in. and overall height 28 in. Blades 10 to 12 in., 21 gage, are used. The weight is 150 lb. net.

"Reducing Power Bills on Mine Fans with Synchronous Motors," is the subject of a paper to be presented before the Association of Iron and Steel Electrical Engineers, by Frank W. Cramer, engineer of tests, Cambria Steel Co., and A. A. McDonald, chief engineer, Union Coal & Coke Co., at its regular monthly meeting to be held at the Chatham Hotel, Pittsburgh, March 18. The authors will show that with the use of a synchronous motor, together with a magnetic clutch, more than $500 per month was saved in driving a mine fan, which delivered 500,000 cu. ft. of air per minute. Another phase which this paper takes up is the replacement of a steam engine by an electric motor. The meeting is open to all engineers interested in these applications.

Mining and Metallurgical Engineers

Discuss Open-Hearth, Electric and Rolled Steel Problems at Annual February Meeting—Important Drill Steel Session—Enthusiastic Non-Ferrous Meetings

AN attendance which ranks among the largest was a feature of the one hundred and twenty-fifth meeting of the American Institute of Mining and Metallurgical Engineers last week, Feb. 20 to 23, in New York, at its headquarters in the Engineering Societies Building. The symposiums on mining, on foreign oil possibilities, on petroleum and gas were unusually well attended. The iron and steel section held two meetings generally regarded as some of the best; a feature was the unannounced appearance on the floor of the eminent British metallurgist, Harry Brearley. The sessions of the Institute of Metals Division were characterized by liberal attendance and marked enthusiasm. A meeting of the committee on breakage and heat treatment of drill steel recorded important progress in this field. The report covering the activities and business condition of the institute revealed a large increase in membership, the largest except in 1920, and a financial condition decidely more satisfactory than in some years.

The Sessions on Iron and Steel

THE first of the two sessions on iron and steel, held Wednesday morning, Feb. 22, was in memory of Prof. Joseph W. Richards, who died last October. The chairman, Bradley Stoughton, spoke of Doctor Richards as for many years chairman of the iron and steel committee and as one of the chief authors of the institute's constitution and by-laws. The iron and steel committee of the institute had therefore decided to designate this session as one in memory of him as an old friend and benefactor. Due to the fact that several memorial meetings had been held and biographies printed, it was suggested that the testimonial at this meeting consist of those present standing in silent tribute to the memory of Doctor Richards.

Acid Open-Hearth Practice

The most important paper on the iron and steel program was entitled "Acid Open-Hearth Process for the Manufacture of Gun Steels and Fine Steels," by Col. W. P. Barba and Dr. Henry M. Howe. The paper, which covers 39 printed pages, is of large importance as a contribution to the literature of this subject and discusses the details of all phases of the process. It was presented in abstract by Colonel Barba.

The chief cause leading up to the formulation of this paper, which is essentially a committee report growing out of the war, was pointed out by Mr. Barba as the sore need of finding some way to stop the rejections of finished gun and other material, which developed in 1918. These conditions are clearly presented by an introduction to the paper by Prof. Comfort A. Adams, chairman of the engineering division of the National Research Council, which is in part as follows:

When this country went into the war, but two companies, the Bethlehem Steel Co. and the Midvale Steel & Ordnance Co., knew how to make steel fit for great cannons and at these concerns there were relatively few men who knew the whole art. Fortunately, certain of these men put their knowledge at the service of the Government, and proceeded to instruct the metallurgists at the arsenals and at various steel works.

The then chairman of the engineering division of the National Research Council, Doctor Howe, suggested that this work might be facilitated, and the number of effective gun-steel makers thereby increased, if a detailed description of the best practice could be written, giving the reasons for the various steps, and issued with the indorsement of a committee composed of those who were evidently the most competent authorities. It was thought that something would be gained by a clarification of the subject, and something by the eminent authority of the members of the committee. To that end, the engineering division appointed a committee, consisting of the gentlemen whose names follow, to mention only those who retained their connection with it.

At this time there were serious difficulties in the manufacture for the Government, of aircraft and high-speed engine crankshafts, of certain ordnance forgings and of shells for both the Army and Navy. This committee was asked to study and report upon these, with a view to betterment of practice. There were indications that the source of some of the difficulties went back to the melting of the steel and the production of the ingot. Hence, the committee first studied steel melting and ingot production, in order to guide the wartime manufacturers to an even larger percentage of useful production from the steel initially melted. The committee referred to above was as follows:

W. P. Barba, chairman, ordnance dept., U. S. Army (formerly vice-president and general manager Midvale Steel Co., Philadelphia).

George K. Burgess, division of metallurgy U. S. Bureau of Standards, Washington.

Henry M. Howe, then chairman engineering division National Research Council.

E. F. Kenney, metallurgical engineer Midvale Steel & Ordnance Co., Philadelphia.

Dorsey A. Lyon, Bureau of Mines, Pittsburgh.

Theodore W. Robinson, vice-president Illinois Steel Co., Chicago.

A. A. Stevenson, Standard Steel Works Co., Philadelphia.

Bradley Stoughton, then secretary American Institute of Mining and Metallurgical Engineers, New York.

W. R. Walker, assistant to the president, U. S. Steel Corporation, New York.

Frank D. Carney, Carney & Lindemuth, consulting engineers, New York.

The committee deputed the authors of the paper to prepare the proposed report, which they did forthwith. This was a few weeks before the armistice in 1918. The paper was completed soon after, so that it represents the work of the authors in the autumn and winter of 1918, but its publication has been delayed by several causes.

Anything like an adequate presentation of the contents of this paper is not possible in these columns. It embodies the results of a research into all phases of the metallurgy of acid open-hearth practice and the best opinions of the authorities on the committee. In his presentation of it Colonel Barba declared that it is impossible to transmit this metallurgical practice into the spoken word or the printed page. A broad idea of the paper in his opinion was comprised in the statement that adequacy of melting equipment was essential—an equipment which will insure the completion of all necessary reactions. With such equipment as a starting point, the following essentials must be observed: Selection of material; melt hot; refine hot; pour cold; use mold of a shape and design suited to the size of ingots best adapted to the finished product. Mr. Barba stated that Doctor Howe had worked prodigiously over this paper. It was also his opinion that American steelmakers are capable of producing as good steel as any foreign maker but there is necessary a program of education as to what grade or kind of steel is suitable for certain purposes. When this is appreciated, the consumer can obtain what he wants; at present in many cases he does not know this.

Discussion by Harry Brearley

Bradley Stoughton, in commenting on the paper, said that so much detailed information had been brought out it would be necessary to revise every text book at present dealing with the subject.

The feature of the discussion was the appearance on the floor, unannounced, of Harry Brearley of Sheffield, England, the eminent British metallurgist whose name is so widely identified with the giving to the world of stainless steels. When his identity was realized, he was given a hearty reception.

Mr. Brearley laid special emphasis on the role which the casting temperature plays, pointing out that this temperature is not the temperature of the steel in the ladle but is determined by the temperature of the metal in the ingot mold. He was of the opinion that very hot Bessemer steel could be poured into good ingots if the temperature is not above the casting temperature in the molds and that the control of the casting temperature is accomplished by observing the temperature in the mold.

ARTHUR S. DWIGHT

He affirmed his preference for the bottom cast ingot molds and explained his reasons by sketches on the blackboard. He acknowledged as one of the disadvantages the possible presence of certain dirt but affirmed that steel making is not a clean operation; in fact his practice, he said, was to clean all molds thoroughly with compressed air before pouring. As another advantage of bottom poured ingots, Mr. Brearley cited the fact that the interior of the mold shapes the ingot. He also recited what he regarded as a splendid measure of the cleanness of a steel and related his experience with a comparison of notched bar impact tests with ordinary tensile tests, the former being at once sensitive to any "dirt" when a progressive series of test bars is cut at various angles from a bar or plate of steel.

Electric Steel for Guns

Another paper along similar lines was that of W. J. Priestley, steel superintendent U. S. Naval Ordnance Plant, Charleston, W. Va., entitled "Sulphur and Oxides in Ordnance Steel." This was presented in abstract by the author but unfortunately was postponed from the morning session to the end of the afternoon, much to the disadvantage of securing discussion. The paper was published substantially in full in THE IRON AGE, Dec. 29, 1921, and commented on editorially. The author, in presenting the paper, gave his views on some of the points brought out in the discussion of the two steel papers presented at the morning session and displayed test bars of some German steel, which showed excellent physical properties from longitudinal tests and very poor ones from tests at right angles to these bars. It was brought out, however, by Colonel Barba that in material such as armor plate, there is a third dimension test which is equally important and the results of which mean much as to the quality of the material for certain purposes.

Chemical and Mechanical Properties of Rolled Steel

A paper, originally scheduled for the meeting of the institute at Wilkes-Barre, Pa., last September, entitled "Application in Rolling Effects of Carbon, Phosphorus and Manganese on Mechanical Properties of Steel," by William R. Webster, Philadelphia, was presented in abstract by A. A. Stevenson. A résumé of the paper was published in THE IRON AGE, April 14, 1921. It is a discussion of the relation between chemical and physical specifications for rolled material, and the question as to whether both are necessary to insure steel of desirable qualities.

In opening the discussion Bradley Stoughton characterized the results in the paper as a triumph for the author, who has maintained the possibility of producing steel of desirable qualities, made to specification, if one has enough data.

Dr. George B. Waterhouse, Lackawanna Steel Co., Buffalo, N. Y., was called upon and in response said he recognized it as a practical paper of wide interest and that his company would be glad to put at the disposal of Mr. Webster any formula or data they possess.

Ralph E. Sweeter, assistant to vice-president, American Rolling Mill Co., Columbus, Ohio, speaking from the blast furnace viewpoint, raised the question of dirty steel due to some peculiar quality of the pig iron; that in rolling steel some of it possessed good and some of it poor properties, although made from batches of pig iron of the same chemical analysis. The presence of oxide of iron had been suggested as the cause.

A. A. Stevenson, speaking on this point, said that it had been his experience that certain qualities in certain pig iron had seemed to persist throughout the making and rolling of the steel, poor qualities which could not be removed.

H. T. Morris, consulting engineer Bethlehem Steel Co., Bethlehem, Pa., cited the fact that analyses of the same steel from different laboratories did not always agree and declared the specification of physical properties and not chemical to be sound. It was his experience that the same chemical composition does not always give the same results in some cases.

Dr. George K. Burgess, Bureau of Standards, Washington, called attention to the great number of variables at work when attempting to make steel to both chemical and physical specifications and to formulæ, but that an important point to be considered was the gas content of the steel. There should be suitable temperature control of operating conditions.

Quality of Steel and Case-Carbonizing

The afternoon session of the steel program was presided over by C. P. Perin, of Perin & Marshall, New York. "The Effect of Quality of Steel on Case-Carbonizing Results," by H. W. McQuaid and E. W. Ehn, metallurgists Timken Roller Bearing Co., Canton, Ohio, was presented in abstract by Mr. McQuaid. The paper presents the experience of the authors in their use of basic open-hearth steel of the same analysis as their own electric steel and that the latter would not produce as good results. The authors concluded that, as a result of many experiments, the segregation of sonims in the ghost lines was a contributing cause.

An interesting discussion of the paper was presented by H. J. French, Bureau of Standards, Washington, and illustrated with lantern slides. It was a comparison of open-hearth and electric steel under various heat treatments, showing particularly the highest content of nitrogen in the electric steel.

"The Electrolytic Deposition of Iron for Building Up Worn or Undersized Parts" was presented by the author, David R. Kellogg, research engineer Westinghouse Electric & Mfg. Co., Pittsburgh. It is a recital of that company's experience in applying this practice in its own shops and many successful results are outlined. A paper, "Effect of Time in Reheating Quenched Medium Carbon Steel Below the Critical Range," was read by one of the authors, Prof. C. R. Hayward, but not discussed.

New Iron and Steel Committee

At this session the new committee of the iron and steel section was elected as follows:

Bradley Stoughton, chairman; John H. Hall secretary; Dr. G. K. Burgess and Enrique Touceda, vice-chairmen.

Since the death of Doctor Richards, the chairmanship has been filled by J. V. W. Reynders, but his election as first vice-president of the institute prevented his continuing in this capacity.

Session on Drill Steel Breakage

A meeting of considerable importance was held on Monday morning, Feb. 20, on the drill steel problem. It was a public session of the committee on breakage and heat treatment and drill steel with B. F. Tillson,

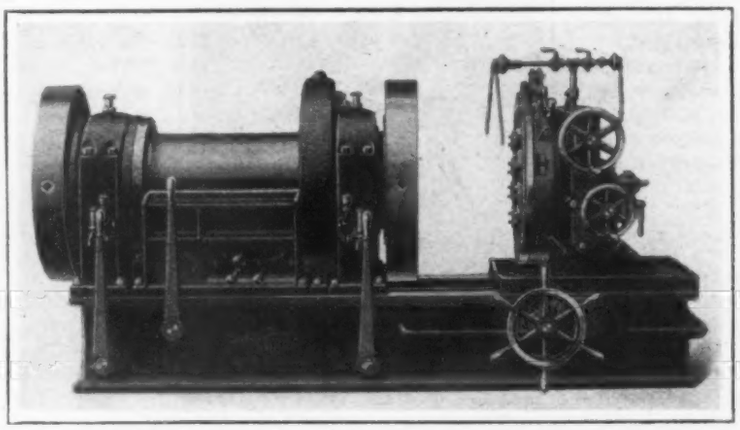
(*Continued on page* 623)

Machine for Threading Large Pipe

The 12-in. pipe threading and cutting machine shown in the accompanying illustration is a recent addition to the line of the Landis Machine Co., Waynesboro, Pa.

The new machine can be used for threading oil-well casing and hydraulic pipe, in addition to ordinary line pipe. It has a range from 4 to 12 in. and can be equipped to thread and cut pipe as small as 2½ in. Two die heads are employed, a 6-in. head for pipe from 4 in. or 2½ in. to 6 in., and a 12-in. head for pipe from 6 to 12 in. The entire range of each of these heads is covered by one set of chasers. The length of the machine is 11 ft. and the width, 5 ft. It weighs 13,000 lb.

The carriage which supports the die head, the cutting-off tool, and the reaming tool is moved either by power or by hand, the power traverse being controlled by a lever on the operating side of the carriage. Automatic stops prevent the die head from coming in contact with the chuck in the forward movement, and the carriage from running off the guides in the backward movement. The reaming tool is set to position and locked by a lever and the reamer fed to the pipe by rotating the cutting-off feed hand wheel in a counter clock-wise direction.



Traverse of the Carriage Is by Hand or Power. To advance, the lever is pulled and held. To reverse, the lever is pushed forward and held. Releasing the lever stops the carriage

The drive is from a single pulley. Eight variations in speed are provided, and are obtained by shifting the levers on the side of the gear box, which is located under the main spindle. The machine is started and stopped through a friction clutch, levers for this purpose being placed at each end of the head stock, permitting convenient starting and stopping when threading or when fitting up flanges. The chucks for gripping the pipe have three jaws, which are geared and have universal adjustment. They are also self-centering to the pipe. The rear chuck is equipped with flange grips for fitting up flanges.

All gears are fully inclosed, and with the exception of the main drive gear and pinion all gears run in an oil bath. The main bearings are lubricated with flat link chains which run in oil contained in large reservoirs. The driving-pinion shaft and the reverse shaft are lubricated by sight feed oilers. In converting to motor drive a sprocket is substituted for the driving pulley and a plate fitted to the side of the machine for mounting the motor. The company's stationary pipe die heads are employed, as well as the Landis long life chaser. A silent chain is used to drive from the motor.

Stainless Non-Ferrous Alloys

The commercial development of stainless steel and iron appears to be causing perturbation among firms (British) interested in non-ferrous metals and alloys, which are perforce beginning to recognize that the new material threatens to supersede copper, brass, nickel, and aluminum for a number of purposes, says the London *Ironmonger*. A good deal of research work has been carried out lately with the object of evolving a stainless non-ferrous alloy, and is already bearing fruit in the shape of the introduction of improved forms of nickel-silver, containing a much larger percentage of nickel than ordinary nickel-silver, and being therefore harder, more durable, and of a color more nearly approaching that of silver. To assert that these metals are untarnishable and stainless may be to claim more than the facts justify, but they undoubtedly represent a distinct advance in that direction, and, in addition, the price should be about one-third less than that of stainless steel and iron. The additional percentage of nickel employed in these metals necessarily increases their cost, but as it gives extra strength it is possible to save expense by using sheets of thinner gage than are supplied in nickel-silver.

Apart from the question of stainlessness, the research has resulted in the production of a more homogeneous metal than formerly, and as this means greater ductility it will now be possible, for the first time, to make deep stampings and pressings from sheets of alloys with a high nickel content.

It is anticipated that the new metals will, to a considerable and increasing extent, supersede electro silverplate for spoons, forks, cruets, table hollowware, wire, and numerous other purposes. The color may not be equal to that of silver, but restaurant-keepers and others whose table furniture gets rough treatment, and costs much money to keep in repair, may consider the appearance quite good enough for their purposes. The new metal certainly has solid advantages. Owing to its strength, goods made of it are not easily damaged, they carry no surface of silver liable to wear off, and can be repaired without necessitating the costly operation of replating. Spoons and forks made of these alloys can be produced at less than half the cost of such goods made of stainless steel or iron.

Ore-Carrying Corporation a Common Carrier

WASHINGTON, Feb. 28.—The Interstate Commerce Commission has handed down a decision finding the Ore Carrying Corporation to be a common carrier which may lawfully receive from its trunk line connections divisions of joint interstate rates. The opinion is the result of a complaint filed by the Ore Carrying Corporation against the Central Railroad Co. of New Jersey, in which the complainant contended that it participates in tariffs published by the defendant, containing joint rates for the continuous carriage of iron ore by water and rail from Port Henry, N. Y., to interstate destinations. It was also contended that formerly the complainant received agreed divisions of the joint rates which were fair and reasonable in amount, but that since the increase of 40 per cent in those joint rates authorized on July 29, 1920, the defendant has refused to grant the complainant a corresponding increase in its division. In finding that the Ore Carrying Corporation is entitled to divisions of joint interstate rates, the commission points out that if the complainant and defendant cannot agree upon proper divisions, the matter may be brought to the commission for determination.

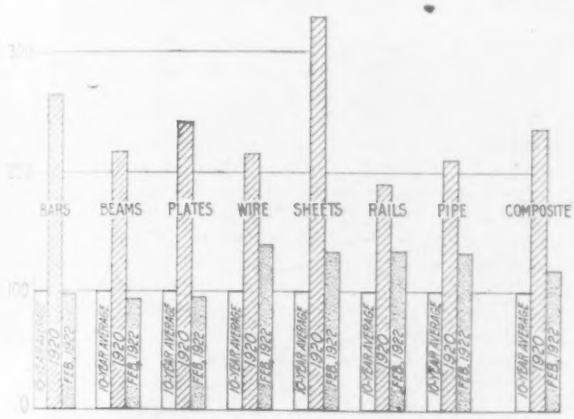
Opposed to Bonus

WASHINGTON, Feb. 28.—Seventy-two per cent of the membership of the Chamber of Commerce of the United States oppose a cash bonus for soldiers, according to the result of the referendum vote recently taken. The vote was intended to put the chamber's membership definitely on record and to supplement a declaration by resolutions adopted previously at two annual meetings. The decision represents the opinions of business organizations in 375 cities throughout the country.

Liquidation of Iron and Steel Prices

About 90 Per Cent of 1920 Excess Wiped Out—No Principal Product Now More Than 35 Per Cent Above the Average of Ten Pre-War Years

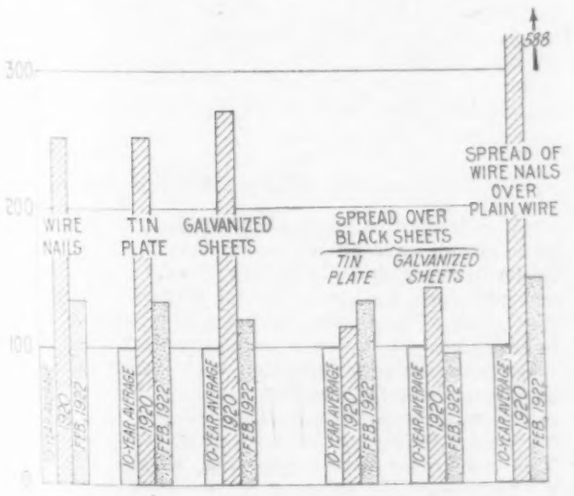
AS THE IRON AGE composite for finished steel is now lower than at any time since the last month of 1915, and the composite for pig iron lower than at any time since September, 1916, a study of the course of prices of the component elements, out of which these composites are made up, should be interesting. The basis for this study represents the average price



Course of Prices of Finished Steel Items

of the individual product, and of the composite, during the ten years from July 1, 1904, to June 30, 1914. This covers a period long enough to evaluate the ups and downs of varying financial conditions. It covers the panic of 1907-08 and the intense activity of 1905, 1906, the early part of 1907 and all of 1910, 1912 and 1913—all of these latter being years of high production. Analyses based on such data therefore stand on a firm foundation.

The high spot shown in each diagram represents the maximum reached during any part of the business boom of 1920. Most of these came in April to September,



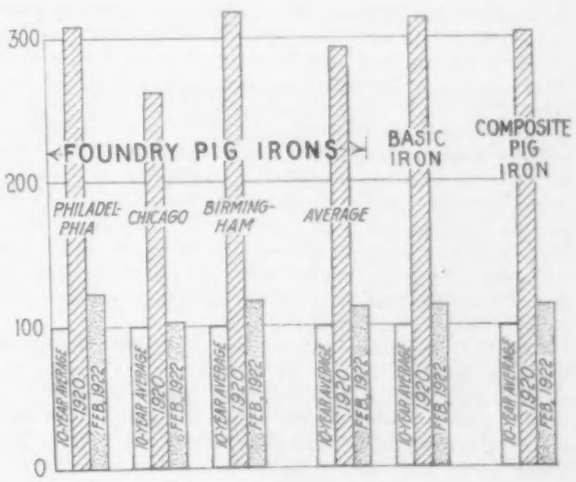
Course of Prices of Steel Specialties, with Spread Over Intermediate Products

but wire nails were high in January and February. No account is taken in this study of the fantastic figures reached by some products in the summer and early fall of 1917, during the first flush of the war period, and before governmental regulation called a halt to the sky-rocketing tendencies of prices. The third point of interest is the price to-day of each of the different items and of each composite.

Each of the three units of measurement is shown on the charts. The first chart shows the relationships of these various prices for the seven separate items making up the finished steel composite, and shows at the right the composite itself. The pre-war average is taken as 100 per cent in each case; the other two figures being related to that, as shown graphically. It will be noted that steel bars, beams and plates are now lower than before the war, and that the composite is above the pre-war average by only 18.7 per cent.

Similarly, in the second chart are shown the items of pig iron making up the pig iron composite, which is also shown. The first three items are the Philadelphia, Chicago and Birmingham foundry irons, the next being the average of the three. Next is the basic iron which, averaged with the foundry average, gives the composite.

In the third chart are shown figures for subsidiary products not included in either composite, these including wire nails, tin plate and galvanized sheets. In addition to the products enumerated are shown the spread of tin plate over black sheets, the spread of galvanized sheets over black sheets and the spread of



Course of Prices of Pig Iron Items

wire nails over plain wire. It will here be noted that, at present prices, the spread of galvanized sheets over black sheets is less than it was before the war.

A comparison of the diagrams shows at once that pig iron was more responsive and more sensitive to local trade conditions than was the case with finished steel. The highest composite figure for pig iron in 1920 was 3.043 times the average before the war, while the corresponding average for steel was 2.353 times the pre-war period. Consequently a smaller percentage recession from 1920 peak prices on the part of steel products than that covered by pig iron will produce a return of pre-war conditions. As a matter of fact, the present recession of finished steel is 49.55 per cent, and the corresponding figure for pig iron 62.3 per cent. This leaves finished steel 18.7 per cent above pre-war and pig iron 14.6 per cent "up."

As a direct measure of liquidation of the 1920 peak excess over the pre-war average, it is found that in finished steel 86.2 per cent of the excess has been wiped off. Similarly, for pig iron, 92.85 per cent of the excess has been wiped out. Taking the two together, therefore, the progress of liquidation in the iron and steel industry may be stated roughly at 90 per cent. Aside from agricultural products, it is doubt-

ful if any other major industry can show a liquidation even approaching this.

There is a remarkable uniformity in the liquidation of various grades of pig iron. Chicago foundry leads with 98.3 per cent; Philadelphia foundry iron shows the least liquidation of any of the four grades covered in our composite. But even here it is 89.1 per cent. With finished steel the items of bars, beams and plates have shown a liquidation in excess of 100 per cent, because their prices are now below those of the ten pre-war years. Of the other items, black sheets show 86.1 per cent; wire and black pipe about 71 per cent and open-hearth rails 63 per cent. Of the subsidiary items, galvanized sheets have liquidated 88.2 per cent, while tin plate and wire nails have liquidated about 78 per cent each.

Welding as Applied to Boilers and Other Pressure Vessels*

Mutually Antagonistic Attitudes of Proponents of Various Types of Welding—Lack of Confidence in Welds

BY E. R. FISH

AFTER several years' experience with the boiler code itself, the Boiler Code Committee of the American Society of Mechanical Engineers found that there was beginning to be a demand for a code covering unfired pressure vessels, of which there are a great variety. We did not know there were so many until we came to look into it. Many of those vessels are made by boiler manufacturers, and a great many of them are made, not by boiler manufacturers, but by tank builders as such. It also became apparent that the States were gradually tending toward improving such tanks in their rules, bringing such pressure containers under their jurisdiction, making them subject to inspection, and that if the great chaos that existed in the boiler trade was to be avoided in the case of tanks, it was desirable to have a code covering the construction of such pressure vessels.

It was with that idea in mind that the Boiler Code Committee appointed a sub-committee on unfired vessels, to look into the question and, if possible, draw up a code. The inspectors of many of the States expressed a very definite desire for a specific code of that sort which, if drawn up, would tend to become the uniform basis of construction, just as the boiler code has become a uniform basis of construction for boilers. That sub-committee was appointed almost three years ago, and gradually it got under way. A code was suggested and a hearing was held at the spring meeting of the society in St. Louis in May, 1920.

At that meeting it developed that the question of welding was really the paramount one. It was the crucial point on which the code really depended. I was not aware myself that so much welding was done on pressure vessels. Everyone knows, of course, that there have been many failures of pressure vessels, particularly of the welded type, and it was the failure of these that stimulated the activity on the part of many municipalities and States to include such vessels in their inspection requirements.

The question was finally referred to a sort of a coalition committee of the American Welding Society, the Welding Committee of the Boiler Code Committee and the Unfired Pressure Vessel Committee. The matter dragged along—it developed that there was great difficulty in getting the interests together. The electric welding fellows were tremendously antagonistic to the oxy-acetylene men, and vice versa, and the forge welding people came into it, and finally the people who make brazed tanks, so that it got to be exceedingly complicated; and it was with great difficulty that any sort of an agreement or understanding of any kind could be arrived at as to what specifications, what limitations, should be imposed upon welded construction.

The final upshot of it was that we had another hearing at the annual meeting of the society in New York, last December, and the code as it had been submitted was published, and some tentative requirements for covering welding were written out. It was all put in pamphlet form and put in circulation and distributed as widely as possible. The hearing drew the largest audience of any of the hearings that were held, indicating the tremendous interest that people had in it. Incidentally, I might say that it provoked, perhaps, the greatest difference of opinion and discussion of any of the hearings that were held.

My information on welding is not at all that of an expert. But I have heard enough to know that those who think they know all about it do not themselves know very much about it. It is entirely in a formative state. There is going to continue to be a great deal of it; there is going to be more of it; it is going to be improved, and one of these days we shall be using it to a much greater extent than now.

So far as boilers are concerned, the code committee at present shows no disposition to permit welding in the construction of boilers, where the pressure is not carried by some other means than the welding itself. It is not at all likely that the committee will change that position for some little time to come.

One of the principal considerations in connection with welded work, it seems to me, is that the welded part is not homogeneous. It has not the same physical characteristics as the plate. In the case of any pressure vessel in which there are changes in temperature, changes in pressure, or weaving actions of any sort, in the course of time the weld is bound to fail, not because of lack of inherent strength under a constant tension, but because of the fatigue of metal that is concentrated at that point.

That, perhaps, may give you a general idea of what the committee has been up against in trying to evolve a code for the unfired pressure vessels. It is easy enough, outside of welding, but unfortunately welding seems to be the principal stumbling block that is holding back the final promulgation of the code.

*Abstract of paper read at Pittsburgh, Feb. 13, before American Boiler Manufacturers' Association.

Farm Machinery Reduced

A reduction of approximately 40 per cent on all lines of farm machinery is announced by the United Grain Growers, Ltd., Winnipeg, Man. In making the announcement, C. Jones, general manager of the company said: "These new prices are not based on manufacturers' prices, but on what we consider a reasonable price for machinery compared with the price of farm products. Manufacturers' prices have not come down yet to a corresponding extent, but the United Grain Growers believe that by next year such a level for farm machinery prices generally will be established. We have based the spring price on the price prevailing in 1915. Generally speaking the prices of farm products are down to the 1915 level."

The United States Hoffman Machine Co., Inc., 101 Fourth Avenue, New York, manufacturer of clothes-pressing machinery, etc., with plant at Syracuse, has been merged with the United States Hoffman Machinery Co., organized under Delaware laws, with capital of $11,250,000. E. D. Stocker is president.

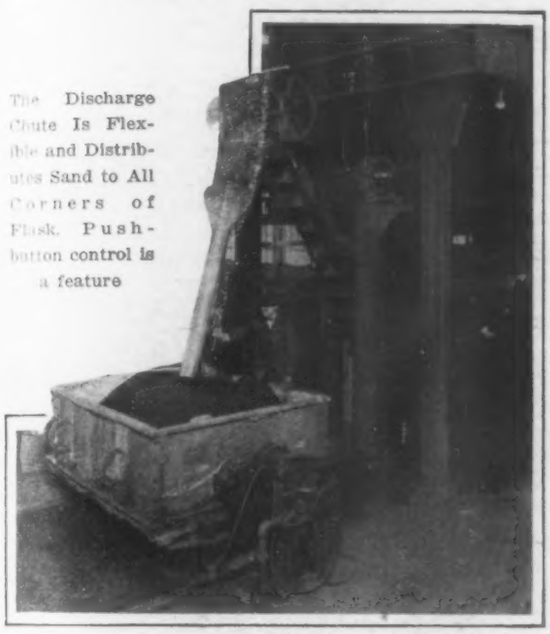
NEW FOUNDRY EQUIPMENT

Stationary Machine for Filling Flasks—Five Molds Per Day Increased to Fifteen

A recent addition to foundry labor-saving equipment is a self-contained stationary flask-filling machine being placed on the market by the Osborn Mfg. Co., Cleveland. It is designed to take sand from the floor and place it in the flask on the molding machine.

With the outfit shown in the accompanying illustration it is claimed that it took two men 1¼ hr. to shovel sand into the flask, the same work being done by the machine in 1¾ min. It is further claimed that tests demonstrated that when the sand was shoveled by hand 5 molds a day were produced against a possible 15 molds with the aid of the flask-filling machine.

The machine is made up of structural shapes with suitable mechanism at each end for supporting sprocket



The Discharge Chute Is Flexible and Distributes Sand to All Corners of Flask. Push-button control is a feature

wheels, upon which standard link chains are mounted. Buckets of special design are employed. A flexible discharge chute designed so that sand can be distributed into all corners of the flask is provided, as shown. The entire outfit stands alone without support. The drive is by an electric motor the capacity of which is determined by the amount of sand to be handled, a 15-hp. being required to handle 2 cu. yd. per min.

In addition to its ability to elevate and evenly distribute a large amount of sand in a short time, a feature of the machine is the ease of control. Control is by push buttons located at the end of the discharge chute, and under the operator's thumb. When not in use the machine may be completely shut off.

The machine may be placed either so that the receiving buckets will be at the floor level or below the floor. Placing several feet below the floor with an open grating at the floor level is recommended, and also that an opening be provided between the flask loader and the foundation pit. It is intended that as the sand is being cut by a sand-cutting machine that it be worked gradually into a heap around the loader, where preferably a clam-shell bucket could be used to good advantage. A portable machine is planned.

Electric Brass Furnace Investigation

The electric melting of brass has been studied by the Bureau of Mines for the past 10 years from the points of view of decreasing the losses of the constituent metals in brass, especially zinc; improvement in labor conditions; aiding in the conservation of fuel oil by substituting electric heat generated by water power or by coal; improving the quality of the brass and decreasing the cost of melting. In the course of the work a furnace type was developed by the Bureau which has found wide use in the industry, both in foundries and rolling mills, more than half of the electric brass furnace kilowattage of the country being connected to furnaces of this type. The Bureau has kept in close touch with makers and users of all other types of electric brass furnaces as well, and a comprehensive bulletin on the design, operation and commercial performance of all the furnaces is awaiting publication. Close contact will be maintained with this problem, but unless developments call for it, no active laboratory work is contemplated because electric melting has already become well established in the brass industry. Contact will also be maintained with developments in the use of electric furnaces for melting aluminum and other non-ferrous metals and alloys, and to a certain extent, with their use for melting gray iron, since some of the furnaces primarily designed for brass melting, including that designed by the Bureau of Mines, are to be tried out in such work.

Improved Specifications for the Composition and Heat Treatment of Gage Steels

An informal meeting was held in New York on Jan. 10 for the purpose of considering improved specifications of composition and the heat treatment of gage steels. The meeting was arranged by the ordnance department of the U. S. Army and was well attended by steel makers, gage makers and gage users. A subcommittee was appointed to arrange and carry out a comprehensive program with a view to determining, first, the physical characteristics required of gage steel and, second, the composition and heat treatment necessary to produce these characteristics. The active cooperative of Government research agencies, standardizing bodies, gage makers and users is contemplated by the committee in the program to be undertaken.

Hearing on Export Bill of Lading

WASHINGTON, Feb. 28.—The Interstate Commerce Commission has reopened proceedings regarding the export bill of lading and assigned March 4 as the date for further hearing. This is due to a communication received by the commission from the Shipping Board, in which the latter recommends that certain amendments which it considers essential be made in the export bill of lading prescribed by the commission on Oct. 21, 1921. Without these amendments the Shipping Board said it is unable to give its approval pursuant to the provisions of Section 19 of the merchant act of 1920, for the reason, among others, that the Shipping Board intends to promulgate a port bill of lading in the near future and believes that there should be no variance in essential particulars between the bills.

Allowances for Switching Not Required

WASHINGTON, Feb. 28.—Independent iron and steel manufacturers in Alabama have been unsuccessful in their efforts to compel trunk line railroads to make allowances for the performance by the former of switching services on inbound and outbound carload traffic to and from steel plants. The Interstate Commerce Commission in a decision made public last Friday held that failure of the railroads to move cars between interchange tracks and points within the steel plants, or to compensate the steel companies, does not result in payment by the steel companies of transportation charges which were or are unreasonable, unjustly discriminatory or unduly prejudicial. As a result, the complaint was dismissed. The case, entitled Gulf States Steel Co. et al. vs. Director General as agent, Louisville & Nashville Railroad Co. et al., included practically all of the larger independent iron and steel manufacturers in the northern part of Alabama, excepting the Woodward Iron Co.

Most of the inbound traffic moves under intrastate rates, and therefore the jurisdiction of the commission as to such rates and allowances was limited to cases falling within the provisions of Section 206 (C) of the transportation act of 1920. The commission held that the question before it was not the measure of the line

haul rates, but the character of the movement of inbound and outbound cars between the interchange tracks and points within the plants. Contention was made by the steel companies that the movement is a part of the transportation service and entitled them to allowances from the trunk lines. The commission said that the steel companies have always made the movement at their own convenience and cost and were satisfied to do so without allowance until the rates were increased on June 25, 1918, and were willing to forego compensation if the rates in effect June 24, 1918, were restored.

Develops Multiple Shaper for Internal Gears

Down-Stroke Model Supplements Previous Machine of Stevenson Company—Essential Features Retained

A DOWN-STROKE model of the multiple-shaper described in THE IRON AGE of July 28, 1921, page 197, has been brought out by the Stevenson Gear Co., Indianapolis. The machine previously described was of the up-stroke type, for plain external spur gears which can be passed through the tool head. The down-stroke machine is for use on internal gears, internal splines, external cluster and other gears, which cannot be passed through the tool head.

The new machine is known as model 6-A and resembles a vertical shaper or slotting machine in general appearance and principle of operation. Like the up-stroke model, the principal unit of mechanism is a special tool head which consists of a series of radially disposed tools spaced about the blank to be cut. Operation is the same as an ordinary vertical shaper except that the tools are held stationary and the work reciprocated past them. The ram carries a blank-supporting arbor. Other units are a mechanism for feeding the tools in to depth gradually to take successive cuts, as in a shaper, and a mechanism for indexing the gears being cut, a space equal to one tooth at every stroke of the ram.

Arbor Changed at Completion of Cutting

The advantages afforded by the new machine, as well as the up-stroke type previously described, lie in the changing of the work arbor at the completion of each arbor full of gears, which is said to be an exclusive feature of these machines. As the actual cutting time of the average arbor of gears is from 1 to 2 min., every second spent in changing blanks and in other non-productive operations, constitutes a considerable per cent of the operating time. To reduce non-productive time to a minimum a hardened and ground spindle and arbor are provided, which permit of quick and accurate removal and replacement. The design of the entire machine is said to be arranged to facilitate this operation. It takes about ½ min. longer to change arbors on the down-stroke machine and therefore whenever possible the up-stroke machine is recommended. There are certain classes of work, however, that can only be handled by the down-stroke machine.

In cutting a gear the blanks are first placed on an arbor. The ram is then elevated to a distance sufficient to permit the tapered shank of the arbor to be inserted in the socket of the ram spindle. The operator then engages a power clutch by means of a lever, which causes a draw bolt, passing through the center of the spindle, to revolve, thereby drawing the arbor securely into the socket. The draw-bolt clutch has an automatic over-load throw-out for disengaging it as soon as the arbor has been tightened. The ram is then lowered by power to the cutting position, automatically stopping in the proper place. The machine is then started by an electric push-button switch. The entire cycle of motions in the tooth-cutting operation is automatic, permitting the operator to load a second arbor while the machine is cutting. When the cutting is finished the machine is stopped by the push-button switch, which operates an electric brake. The ram is then elevated to the position shown and the draw-bolt lever reversed, which ejects the arbor. The arbor of uncut blanks is then inserted and a new cycle of operation begins.

The tool head used is almost identical with that on the up-stroke machine, the tool bits and important parts being said to be completely interchangeable. Two toolheads are provided, one in use and one in reserve. The tools of the latter may be sharpened and reset to be in readiness to replace the one in use when the tools in operation become dull. The work arbor is interchangeable with those of the up-stroke machine.

Successive feeding movements are imparted to the tools by an annular sectional cam ring. As in the

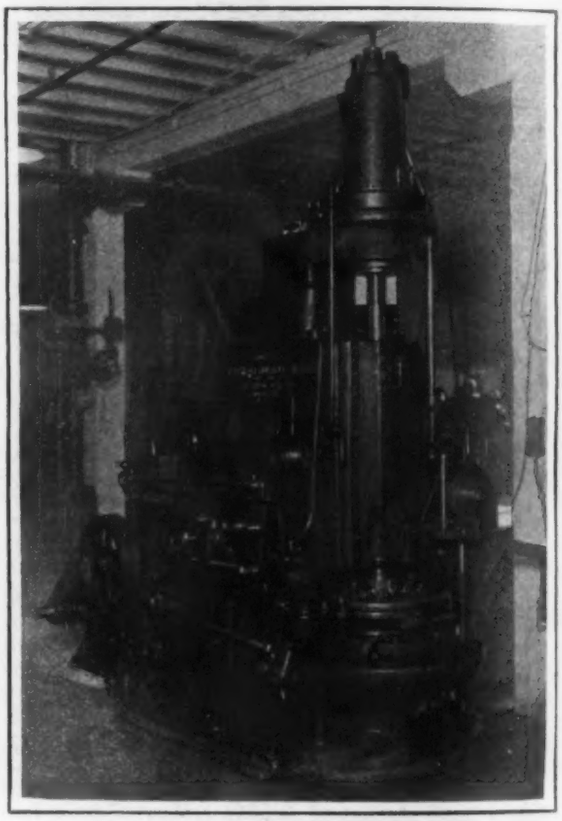


Fig. 1. Up-Stroke Multiple Shaper for Internal Gears

model previously described the individual cam lugs are mounted on a large ring which surrounds the tool bits and spacing plates. The tool bits are adjusted individually along the T-slot relative to the cam ring and each other. Rotary feeding movements are given the cam ring through a gear train, seen at the left side of the tool head in Fig. 1, and are produced by a feed mechanism located on the left side of the machine, as shown. The final depth to which the tools are fed is determined by a micrometer stop, which limits the rotary feed movement of the cam ring.

A reverse feeding movement is imparted to the cam ring to provide relief to prevent the tools from dragging on the back stroke of the ram. The cover plate on top of the tool plate intermittently clamps and releases the tool bits during the cutting. The clamping is by means of an eccentric which is oscillated by a cam on the main crankshaft.

The feed mechanism is shown in Fig. 1 and Fig. 2 consists of the cams and levers for producing the feeding and relief movements. The spiral cam seen

near the center is rotated slowly and intermittently by a ratchet through a worm and wheel connection. The rotary movements of this cam gradually forces the fulcrum stud of the feed arm forward, which in turn produces a longitudinal movement of a sort of rack slide which is connected by a gear train to the

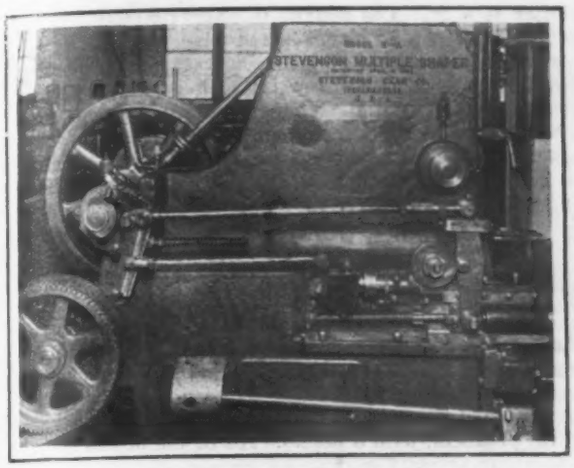


Fig. 2. Relief of Tools Is from Cam on Crankshaft, at Left

feed-cam gear on the tool head. This feed rack is made in the form of a worm engaging a worm wheel so that adjustments may be made by rotating the worm, thus advancing or withdrawing the position of the tool bits without change in the longitudinal position of the feed rack itself.

The relief movement of the tools is derived from a cam on the crankshaft and a rocker arm, seen at left of Fig. 2. This movement is transmitted by a connecting rod to a stud at the upper end of the feed rocker arm. The relief-cam rocker arm has a T-slotted extension which actuates the feed ratchet through a bevel gear segment and pinion. By adjusting the feed connecting-rod stud along the T-slot, any desired fineness of feeding may be obtained. A strong spring attached to the relief rocker arm serves to hold the follower roller in contact with the relief cam on the crankshaft.

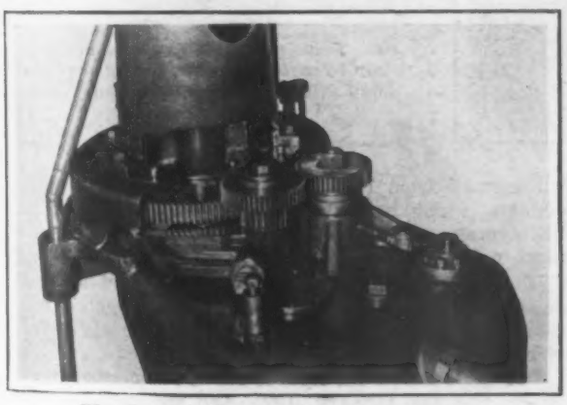


Fig. 3. Details of Indexing Mechanism

Another spring, somewhat weaker, is attached to the feed rack slide and serves to hold the feed rocker arm in contact with the spiral feed cam.

The indexing mechanism—Fig. 1 and 3—consists of two semi-cylindrical guides, one of which is attached to the ram spindle, the other to a revolving drum on which is mounted a large spur gear. This is driven through change gears by a pair of intermittent Geneva gears, encased in an oil-tight housing, which are driven in turn from the crankshaft by a long connecting shaft —Figs. 4 and 2. The intermittent shaft driven gear and the compound gear shaft driven gear are used as change gears, and by varying their ratio any number of divisions desired may be indexed. A differential washer is incorporated as a driving member between the intermittent shaft and its gear, to provide an angular adjustment for cutting gears which have keyways, etc.

The ram mechanism consists of a crank which drives a reciprocating rack slide which in turn transmits its motion to the ram through two gears on a rock shaft. The rack slide is in the form of a worm and engages one of the gears on the rock shaft which is made in the form of a worm wheel. When elevating the ram for changing arbors the rack slide is held stationary and given a rotary movement which rotates the worm wheel and rock shaft and moves the ram. This rotary movement is obtained through a gear train seen in Fig. 4, and derived from a small motor which also furnished the power for actuating the draw bolt. The elevating and lowering motion of the ram is limited by stop collars on the shifting rod which engage and disengage the driving clutches. The crank head is slotted and the crank pin made in the form of a T-bolt. It may be adjusted for any length of stroke from 0 to 6¼ in., graduations on the crank head indicating the various lengths of the cutting stroke. The graduations provide for the extra length of stroke needed to give the necessary over travel before and after the cut begins, for indexing, feeding, etc.

To set the ram and work in proper relative vertical

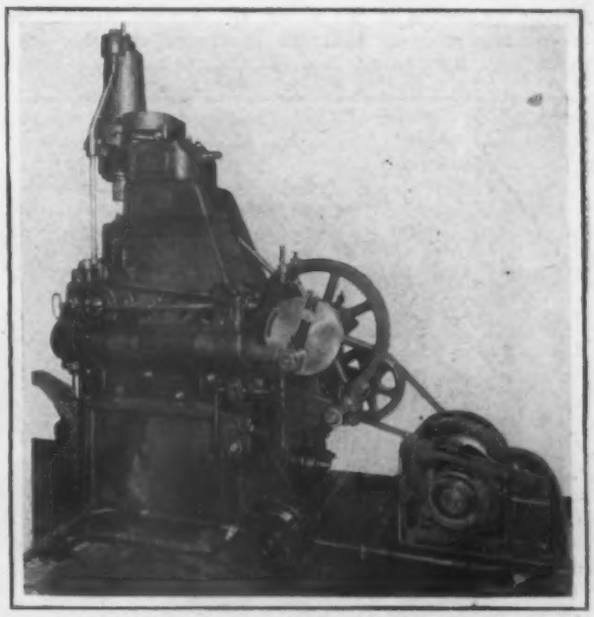


Fig. 4. Side View Showing Drive and Part of Indexing and Ram Mechanisms

position to the tools, a stationary pointer is attached to the machine frame. A corresponding mark is made on the crank head in such an angular position to the crank pin that when the mark on the crank head is set opposite the pointer the ram may be adjusted downward until the lower side of the blanks is even with the cutting edge of the tools. The elevating control stops are then set to correspond. This feature is a great convenience to the operator.

These machines will be built in various sizes and models according to the size and nature of the product, from the smallest watch pinion to large circular saws. Where the number of pieces of one kind is great enough to warrant it, special machines or standard machines with special attachments will be built.

Insufficient attention has been given to the role which standardization is playing in German industrial reconstruction, it is declared by E. C. Peck, general superintendent Cleveland Twist Drill Co., chairman of the standardization committee of the American Society of Mechanical Engineers. "In no other country, except Great Britain," says he, "is standardization work being carried on upon a scale, or with an intensity, comparable to that in Germany." He points out that mass production is no longer primarily an American development, but that the lesson of the war has brought home to European countries realization of its significance. The mechanical engineers will also take up the question of standardization and research at the Atlanta meeting.

Four-Way Drilling Machine

The four-way drilling machine shown in the accompanying illustrations was developed by the Reed-Prentice Co., Worcester, for drilling the four holes in the rear-axle housing of a well-known tractor. Several of these machines are said to be in operation in various classes of automotive work, the makers claiming large output and high standard in quality of work produced.

There are four spindles, operated simultaneously by a feed mechanism inside the base, and engaged by the movement of lever A. When the drills have been fed through the work, an automatic trip releases the feed to the four spindles simultaneously. The trip cam is shown at B on the drum C. The cam comes in contact with the plunger D, thereby automatically tripping the feed.

The drive to the spindles is by belt. The spindles are advanced or withdrawn by turning hand wheel E, which controls the action of all the spindles. When the drills become short, the inner spindle, F, may be adjusted longitudinally and finally clamped to the main spindle by means of the closer, G. Forced lubrication is provided for all bearings inside of the machine, sight-feed oilers being used for the main-spindle bearings. The force system is also supplied for furnishing cutting compound to each drill.

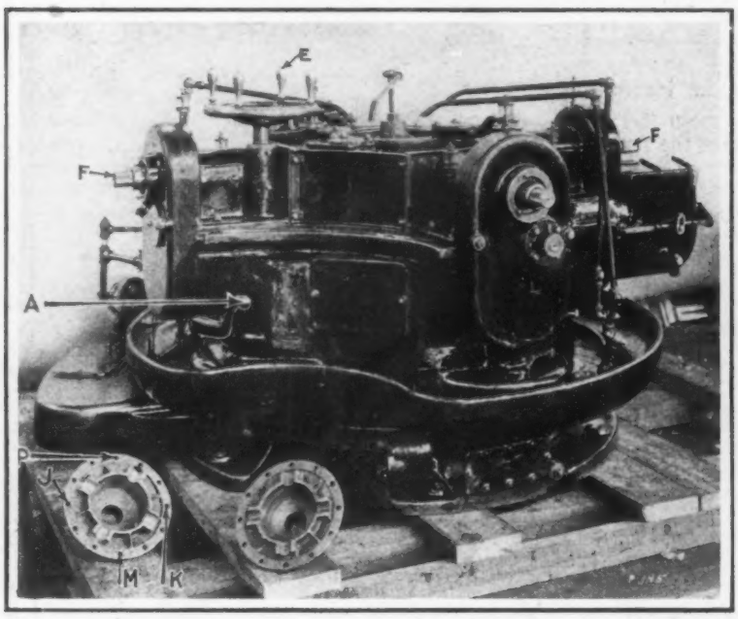
The holding fixture is an outstanding feature, several novel arrangements being necessary to enable quick handling of the work, as well as properly locating it relative to the four working spindles. The fixture is clearly shown in the separate illustration. For guiding the work centrally four hardened steel strips, H, are located inside the fixture. Guiding pins in the lower part of the fixture engage two of the holes in the housings, as at J and K; these holes locating the bearings in the proper position for the drills.

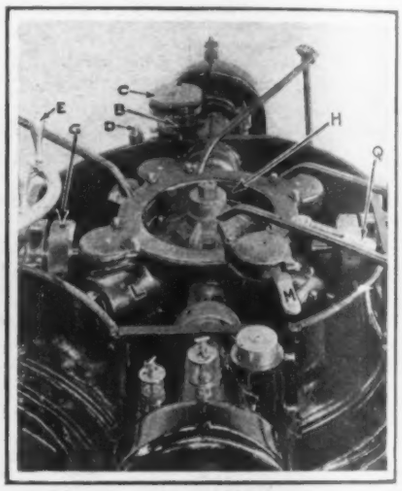
The lower half of the housing is dropped into position first, after which four plungers in the bearings, 90 deg. apart, as at L, are forced toward the center by means of the lever M. The upper half of the housing is then dropped into position and set by means of the guide pins on the plunger, which are now in proper position, controlling the position of the housing by four holes in the flanges, as J, K, N and P. By means of the center bolt which passes through both of the housings, the work is clamped tight to the slabbed portion of the plungers. This rigidly supports the work during the drilling operation.

After drilling, the upper part of the housing is removed and after withdrawing the four main plungers, the lower is raised by lever Q. This actuates four vertically-operated plungers, and brings the lower half into position for lifting out of the fixture. Hardened-steel bushings in the main body of the fixture serve to guide the drills, assuring close accuracy as to the plane of the holes and their angularity.

The machine is 96 in. long, 85 in. wide and 48½ in. high, overall. The maximum spindle travel is 3½ in. The distance between opposing spindle chucks is 26 in. maximum, and from the flat of the table to the spindle center is 6 in. The weight is approximately 7560 lb. Motor drive can be incorporated when desired.

Another machine of somewhat smaller proportions covers lighter classes of work such as universal-joint rings and differential spiders; drilling the four holes simultaneously in the ring or turning the four arms simultaneously on the crosses. The smaller machines are not as heavy as the one described, although embodying the same features.





Four Spindles Are Operated Simultaneously by a Feed Mechanism in the Base. Detail view above shows the holding fixture

Cost of Living Slightly Lower

Monthly figures of the Bureau of Labor Statistics show the wholesale prices of all commodities during January to be 48 per cent above the average for 1913, compared with 49 per cent in both December and November. Only one of the nine individual groups showed a rise in January compared to December, this being farm products, with 3 points. All of the others showed decreases of from 1 to 5 points. In metals and metal products, which now stand at 17 per cent above the 1913 average, the decrease was 2 points. This item is only 1 point above farm products, and is far below any of the others. The highest item on the list still continues to be housefurnishing goods, which, together with building materials, are more than double their 1913 prices.

Our table shows the figures for the two most recent months and for January, 1921, and the peak in 1920. It shows also the amount of liquidation, between the 1920 peak prices and the present, of the excess of the peak prices over the average of 1913. Metals have been liquidated to a greater extent than any other group, except the farm products.

Index Numbers of Wholesale Prices, by Groups of Commodities

(1913 equals 100)

	1920	1921		1922	Liquidation.
	Peak	January	December	January	Per Cent
Farm products	246	136	113	116	89.0
Food, etc.	287	162	139	134	81.8
Cloths and clothing	356	208	185	183	67.6
Fuel and lighting	284	228	187	183	54.9
Metals and metal products	195	152	119	117	82.1
Building materials	341	239	203	202	57.7
Chemicals and drugs	222	182	161	159	51.6
House-furnishing goods	371	283	218	214	57.9
Miscellaneous	247	190	148	146	68.7
All commodities	272	177	149	148	72.1

CONTENTS

March 2, 1922

Open-Hearth Furnace Design 577
Calculations for Hearth Area, Depth of Metal, Incline of Ports and Velocity of Gases

Roberts Type of By-Product Coke Ovens 580
Granite City Batteries Produce Metallurgical Coke from Illinois and Indiana Coals —Design and Operation

Mining and Metallurgical Engineers Meet 586
Discuss Open-Hearth, Electric and Rolled Steel Problems at Annual February Meeting

Liquidation of Iron and Steel Prices 589
About 90 Per Cent of 1920 Excess Wiped Out—No Principal Product Now More Than 35 Per Cent Above the Average of Ten Pre-War Years

Welding of Boilers and Other Pressure Vessels 590
Mutually Antagonistic Attitudes of Proponents of Various Types of Welding—Lack of Confidence in Welds

Industrial Conditions in Belgium..... 579
Motor-Driven Portable Disk Sander..... 584
Duplex Hand Milling Machine..... 584
New High-Duty Drilling Machine..... 585
Hacksaw Machine Using Light-Gage Blades at High Speed..... 585
Machine for Threading Large Pipe..... 588
Stainless Non-Ferrous Alloys..... 588
New Foundry Machine for Filling Flasks 591
Electric Brass Furnace Investigation.... 591
Switching Allowances Not Required..... 591
Multiple Shaper for Internal Gears..... 592
Four-Way Drilling Machine..... 594
Cost of Living Slightly Lower..... 594
Editorials 596
A Railroad Reservoir—Employment in Coal Mining—Again a Stainless Metal —Sound Principles Opposed—Steel Ships Offered for Sale.

Correspondence 599
Mr. Peters Replies to Mr. Roberts—Casting Steel Pipe Centrifugally.
Coming Meetings 599
Higher Tariff Rates Asked on Pig Iron.. 600
New Blast Furnace Records..... 600
Labor Notes 600, 625, 626
Legal Points of Pittsburgh Base..... 601
Strength of Alloy Steels at High Temperatures 601
Boiler Sales in 1921..... 612
Foreign Trade Conditions.....615, 616
Puddlers' Wage Scales..... 616
Waste in Foundries..... 618
Hog Island Surplus Steel Sold..... 618
Nitrogen in Oxyacetylene Weld..... 619
Thermal Expansion of Metals and Alloys. 621
Taylor Society Meeting..... 621
Vehicular Tunnel Contract..... 622
American Incomes, Farmer and Otherwise 625
Refractories Market 626
Industrial Finance 633
Office Changes 635

Iron and Steel Markets.....602
Comparison of Prices.....603
Prices Finished Iron and Steel f. o. b. Pittsburgh.....617
Non-Ferrous Metal Market.....619
Personal Notes.....620
Obituary Notes.....621
Machinery Markets and News of the Works.....627
New York Jobbers' Prices.....636

ESTABLISHED 1855

THE IRON AGE

EDITORS:

A. I. FINDLEY WILLIAM W. MACON GEORGE SMART

CHARLES S. BAUR, *Advertising Manager*

Member of the Audit Bureau of Circulations and of Associated Business Papers, Inc.

Published every Thursday by the IRON AGE PUBLISHING CO., 239 West 39th Street, New York

F. J. Frank, *President* PRINTED IN U. S. A. George H. Griffiths, *Secretary*

Owned by the United Publishers Corporation, 243 West 39th Street, New York. H. M. Swetland, *Pres.* Charles G. Phillips, *Vice-Pres.* A. C. Pearson, *Treas.* F. J. Frank, *Secy.*

BRANCH OFFICES—Chicago: Otis Building. Pittsburgh: Park Building. Boston: 410 Unity Building. Philadelphia: 1420-1422 Widener Building. Cleveland: Guardian Building. Detroit: 317 West Fort St. Cincinnati: Mercantile Library Bldg. Buffalo: Ellicott Square Building. Washington: 816 Fifteenth St., N. W. San Francisco: 320 Market St. London, Eng.: 11 Haymarket, S.W.1.

Subscription Price: United States and Possessions, Mexico, Cuba, Shanghai, $6.00; Canada, $8.50; Foreign, $12.00 per year. Single copy 50 cents.

Entered as second class matter, June 18, 1879, at the Post Office at New York, New York, under the Act of March 3, 1879.

A Railroad Reservoir

Remote though a collapse of the railroads may seem, close students of transportation do contend that it will not take a great expansion of shipments to produce paralysis, more or less partial. A way out is suggested and this will probably interest business in general, as it involves buying of equipment. The drawback is that it is not clear that the power to help the situation will be exercised.

The proposal is to establish what may be called a national reserve of rolling stock and motive power to carry any or all of the railroads over a peak demand. The Esch-Cummins act provides the finances, as it is believed that the excess earnings over the 5½ per cent belonging to each road could be diverted toward establishing the reserve. It is estimated that on the 1921 account $12,000,000 of excess earnings will accrue to the Government, as even under the adverse conditions of 1921, some railroads were capable of surpassing the 5½ per cent minimum.

The argument for the national reserve is, of course, that providing for the peak load burden should not be the concern of a few of the large railroads, and it follows that none of the large 100 nor of the 3000 large and small railroads is expected to provide the emergency capacity. It remains for railroad executives to ascertain just how under the transportation act they may establish, if they choose, railroad equipment to be used for the common good, so to speak; it seems clear that Government agencies are not likely to take the initiative.

If the railroads are left to drift, a car shortage will by that fact be surer. There will then be the renewed cry for Government ownership. Should the shippers put the onus on the private managements and should they turn an ear to the Government ownership propagandists, it would be difficult to save the railroads. The national reservoir of transportation facilities certainly looks theoretically attractive; indeed it appears as essential. The demand is for railroad leadership, which can now undoubtedly count on Government assistance in the executive departments, assuming no special legislation is necessary.

Employment in Coal Mining

It is a deplorable condition when the public is required to pay an excessive price for an article because there is an excess of capacity for producing the article. We are often told that the great law of supply and demand controls prices and this "law," as commonly interpreted, means, if it has any practical meaning at all, that the greater the productive capacity the more likely is the thing produced to be cheap.

What is the condition in coal mining that coal must be sold at a higher price, on account of the great productive capacity in existence, than would be requisite if the industry were efficiently alined, with a smaller capacity?

Discussion is now rife as to conditions that will obtain at the union bituminous coal mines after April 1. The discussion is as to whether the United Mine Workers will negotiate with part of the former central competitive field, now that it is established that operators in certain districts, including the Pittsburgh district, refuse to take part in such negotiations, as to whether the miners individually will be disposed to strike to maintain the check-off, and as to various similar matters. The discussion takes no thought in the direction of the economic problem involved.

Yet there is a great economic problem. The miners demand a relatively high mining rate per ton because, as they say, they are not fully employed. They deny that citations of high earnings by certain miners furnish reason for reducing the tonnage rate, because those miners worked nearly if not quite full time, and the average miner is not permitted to do that.

No one denies that the miner should be paid a higher rate per ton than it would be fair and equitable to pay him if he worked full time. Thus we are as a matter of bare fact recognizing the principle of the minimum wage, however objectionable that principle may be. Surely we all know that the principle of the minimum wage

cannot be universally applied without producing confusion, disorganization and eventually a much worse condition than the one it would be aimed to improve. In general, the total amount of money received for goods sold or services rendered is divided 70 to 80 per cent for wages and salaries and 30 to 20 per cent for capital and direction.

If it were decreed that all wages and salaries should be raised to certain amounts, one of two things or a combination of the two would occur. Prices would advance so that the new income of the individual would buy no more than before, or part of the adjustment would be made by capital receiving less, whereupon a readjustment would begin through expansion in industry being stopped and the share of the capital already invested would increase, through buyers competing for the product of that capital. The scheme, generally applied, simply would not work. If applied to a small group of workers it could be made to work by laying the cost upon the other workers. That idea is repugnant. Why do we consider the practice natural and tolerable because coal mining is the field in which it prevails?

The inefficiency of the coal mining industry has been universally recognized and some little abortive attempts have been made to find means for improving the situation, such as the seasonal coal freight rate suggestion. There were very practical objections to that proposal, and at best it could not have done much good. It aimed to distribute employment of coal miners over the year, but that would leave the difficulty that the total employment in a year is not enough. Even if there were what by the common concept is considered full employment, there would be only one-third employment of the capital investment, for the highest objective is an eight-hour day. The crux of the matter, of course, is simply that the time of the miner is not efficiently employed. In recent years the miner has been indisposed to seek other employment for his spare time, the operators are indisposed to engage in new lines of business that could employ him, and the very thought is abhorrent to the labor leaders.

An extreme case of post-war liquidation is afforded by the market for 50 per cent ferrosilicon. While deflation in most materials playing a rôle in the iron and steel industry has been marked, there has been no parallel to that in ferrosilicon. In 1913 and 1914 this ferroalloy, so important in basic open-hearth practice, was selling at $73 to $75 per ton and at $71 to $73 per ton, delivered, in the two years respectively. During the war the price gradually advanced until in 1917 as high as $250 was obtained for prompt delivery. Since 1920 there has been a gradual decline from a delivered selling price around $80 to one ranging at present from $55 to $60 per ton, or a liquidation of over 25 per cent from the 1920 level and of about 22 per cent from the pre-war price. War demand was an incentive to the installation of new plants to make this alloy and the stocks left over after the 1920 boom have been one factor in the severe price recessions. It is a fact, however, that uses have been developed for the alloy in other lines than in basic open-hearth steel making, and post-war conditions find it, if anything, a raw material of increased importance.

Again a Stainless Metal

Developments in stainless metals are following fast, one upon another, in Great Britain. The appearance of the so-called "stainless iron," and its possibilities, have spurred the non-ferrous producers to new achievements. If all reports are to be given credence, important results to industry may be the outcome.

The production of "stainless iron" and its properties were called attention to in these columns, Sept. 22, 1921. It is really low-carbon stainless steel which can be rolled and forged into sheets, wire and other products, a property not characteristic of the regular stainless steel. The principal drawback is its cost because of the expensive low-carbon ferrochromium necessary to its production. According to the latest reports, however, a new process has been discovered by an Englishman whereby this important low-carbon ferroalloy can be produced at around 20c. per pound and with a carbon content of about 0.25 per cent as compared to about 55c. to 60c. for the present product made here. The inventor has recently been in the United States looking after the rights in this country. Wide interest, amounting to enthusiasm, prevails in England because the possibility of cheap commercial production of a low-carbon, stainless steel is believed to open up wide uses for it as sheets, wire and many other materials, the results of which are obvious.

In the non-ferrous field, British research is reported to have developed a stainless alloy which threatens to supersede copper, brass, nickel and aluminum for many purposes. More details of this appear elsewhere in this issue. It is an improved form of nickel-silver containing a much larger percentage of nickel than ordinary nickel-silver and therefore harder, more durable and more nearly approaching silver in color, with the added claim that its price can be reduced to about one-third that of stainless steel or iron as now made.

These developments, and other similar ones more familiar, may not lead to the general use of stainless products but they bring visions of a possible "stainless metal age," when these or similar materials will find a thousand and one uses where rusting products now cause untold expense and trouble. The enthusiasts in England are predicting just such happenings, largely as a result of the recent discovery referred to. It is not wise to throw cold water on this belief, for only a few years ago stainless steel was unknown. One may safely take the position of watching developments, as sooner or later, each new thing, heralded and unheralded, finds its proper place in the scheme of things.

For an illustration of drastic slumping in American exports in 1921, one needs only to look to zinc statistics. It was probably without a parallel in that or any other metal. Foreign de-

mand for American zinc as pig, slabs, etc., in 1913 was 15,565,324 pounds. This totaled 243,830,248 pounds in 1919 and over 204,000,000 pounds in 1920, exceeding any of the war years. But in 1921 only 4,785,653 pounds were exported, less than one-third of the 1913 outgo and less than 2 per cent of the peak year. Were it not for the unprecedented demand last year from Japan, amounting to 2,645,355 pounds or over one-half of the total, American zinc exports would have reached almost the vanishing point. While the American zinc industry has never depended on foreign demand in normal times, the conditions last year of poor domestic demand, coupled with small exports, set down 1921 as one of the lean years in the industry.

Sound Principles Opposed

The recent decree agreed upon by representatives of the National Government and of the Bricklayers', Masons' and Plasterers' International Union of America is an indication of what a labor union will do under compulsion. Members of the union were facing prosecution and the evidence apparently was very strong against them. Under these conditions, it is not surprising that the decree proposed by the attorney general was agreed upon. But it should be noted that the ink on the decree had hardly dried when the executive council of the American Federation of Labor at a regular session at Washington adopted resolutions reaffirming its opposition to injunctions as a weapon against labor strikes and calling upon organized labor to ignore such orders when issued by the court. The resolution is militant in tone and calls upon organized labor to make a flat refusal "to recognize or abide by the terms of the injunction which seems to prohibit the doing of actions which the workers have a lawful right to do or which seeks to compel workers to do those things which they have a lawful right to refuse to do."

The principles laid down by Attorney General Daugherty to which the union agreed provided that there should be no limit to the productive capacity of the individual workman; that the right of the employer to purchase his material wherever and whenever and from whomever he may choose whether these materials be union made or otherwise should not be restricted; that there should be no favoritism shown by organized labor toward employers or trade associations or contractors' associations and no discriminations indulged in against the independent employer who may not be a member of such an association; and finally that the labor organization is not to be used as an instrument for the collection of debts or enforcement of the payment of alleged claims. All of these principles and particularly the first named are in direct conflict with the practices of many labor unions, and the statement of the Department of Justice set forth very clearly the abuses which have assumed various forms under the domination of the unions, often in co-operation or in conspiracy with contractors' associations. It would seem that a fair labor union would not hesitate to adopt the principles, but it is too much to hope that this will become the case generally. On the contrary, the action of the executive committee above referred to indicates that a fight for the old abuses may confidently be expected.

Something, however, has been accomplished in fixing sound principles to govern, for a time at least, over 100,000 members of a prominent union, and courts have been furnished a fine example of what can be done toward the regulation of obstreperous union labor leaders.

Steel Ships Offered for Sale

Advertisements of the United States Shipping Board, published in papers in New York and elsewhere, list for sale a total of 1490 vessels, varying from 100-ft. tugs to ocean liners of 20,765 deadweight tons. The magnitude of this sales effort may be appreciated from the fact that the total deadweight tonnage of the 1406 ships listed by tonnage amounts to 9,972,195. This is greater than the total tonnage in 1914 of the German mercantile marine—then the second largest merchant fleet in the world. It is heavier than the combined tonnage to-day of the three largest merchant fleets outside those of Great Britain and the United States.

The principal group consists of 1294 steel cargo ships, varying from 2625 tons to 13,312 tons. More than 5,000,000 tons represent steel cargo ships of 8000 tons each and upward—a magnificent fleet of heavy duty cargo carriers which alone is far in advance, in point of tonnage and capacity, of the entire American merchant fleet of 1917. Steel tankers numbering 83, together with eight concrete tankers, account for a total of more than 800,000 tons additional. There are also 23 of the new 13,000-ton passenger and cargo liners designed for service to South American ports, and 20 steel passenger and cargo vessels seized from enemy nations at the beginning of the war. What will be the effect of the realinement of ownership of these ships, assuming that few will be bought for destruction or for use as monuments, is difficult to suggest, but the thought of the volume involved begets thought on the distribution.

Claims Board Dissolves

WASHINGTON, Feb. 28.—Its work having been practically completed, the War Claims Board of the War Department will be dissolved to-morrow. More than 30,000 claims against the Government in connection with war-time contracts, many of them made with iron and steel manufacturers, were recorded, only 31 of which remain undisposed of by the board, according to Acting Secretary Wainwright. The latter are of such a nature that they can be disposed of through the regular legal machinery of the War Department.

The Automatic Machine Co., Bridgeport, Conn., machinery manufacturer, held its annual meeting recently and elected the following officers for 1922: President, Frederick J. Kingsbury, New Haven; vice-president, James Coulter; treasurer and general manager, Norman Leeds; secretary, A. J. Porter. The directors are: Henry A. Bishop, M. F. Burns, William E. Burnham, James Coulter, Stiles E. Goodsell, F. J. Kingsbury, Norman Leeds and William R. Webster.

CORRESPONDENCE

Mr. Peters Replies to Mr. Roberts

To the Editor: I have read with interest the open letter by Frank C. Roberts, C. E., of this city, on pages 538-539 of your issue of Feb. 23, in which he criticises certain statements in the article on the Warwick Furnaces which appeared in THE IRON AGE of Feb. 2. As I happened to prepare the article in question, I deem it proper to ask that I may be permitted to point out to Mr. Roberts through your columns that he is hardly justified in definitely asserting that my statement "is incorrect" wherein I said that "the lines of the new (No. 2) furnace were obtained by proportionate enlargement of those of the older stack."

This information was given to me by the late Edward B. Cook, son of Edgar Cook, and as the procedure was rather unique to me, I made a note of it at the time. Fortunately for the defense of my statement and my memory, the facts are confirmed by Mr. Cook himself in his discussion of the paper on "Modern American Blast Furnace Practice" presented by H. A. Brassert at the May, 1914, meeting of the American Iron and Steel Institute.

Mr. Cook's remarks were confined to the practice at the Warwick furnaces and may be found on pages 102-113 of the year book of the institute for 1914, from which I quote as follows, the italics being mine: "First blast, 1901 to 1904.—*The lines of the first blast were obtained by practically making an enlarged photograph of the No. 1 furnace* 70 ft. high, which had done satisfactory work on merchant pig iron of various grades, using the usual materials commonly employed in the East. The records show that the first blast *was extremely unsatisfactory*. Passing through the period of organization on a new plant would account for some of the trouble, but the management felt that there were *serious difficulties with the furnace itself.* * * * The lines of the second blast were copied from the Edgar Thompson standard at that time."

I believe that a careful study of the records of the several blasts as shown on pages 112 and 113 of the publication above mentioned will to a degree substantiate my statement that "these lines did not give the desired results" as the change from the first lines resulted in marked improvement in daily output, fuel and stone consumption with a noticeable reduction in top heats.

I heartily subscribe to what Mr. Roberts has to say concerning Mr. Cook's ability as a furnace manager, and endeavored to convey this thought in the story as I wrote it, at the same time giving facts which seem to be a matter of record. RICHARD PETERS, JR.

1008 Real Estate Trust Building.
Philadelphia, Feb. 25, 1922.

Casting Steel Pipe Centrifugally

To the Editor:—I have read with great interest your editorial in THE IRON AGE, Feb. 9, on the subject, "Progress in Centrifugal Casting."

I note that you mention, as still somewhat unsettled, the subjects of temperature control of the metal and proper speed for centrifugal casting. As a matter of fact, however, both of these have been pretty well determined, experimentally and proper rules for the temperature control have been established. The matter of speed is controlled by a simple formula of the type $K/\sqrt{r}$, where K is a constant that varies for different metals, and r the radius of the casting in inches. The full derivation of this formula, together with the rest of the mathematics of centrifugal casting will be given in my paper before the American Society of Mechanical Engineers, at Atlanta, Ga., in May.

L. CAMMEN.

New York, Feb. 14.

The Berwick Car Works, Berwick, Pa., has received an order to repair 500 cars for the Delaware, Lackawanna & Western Railroad.

Mechanical Engineers' Spring Meeting

The program of the meeting which the American Society of Mechanical Engineers is to hold in May in Atlanta, Ga., is planned to put special emphasis on engineering phases of Southern industries. Incidentally there will be excursions to Birmingham, Greenville, S. C., Mussel Shoals, Ala., and Pensacola, Fla. The society held a spring meeting in 1916 in New Orleans and it is emphasized that in the interval the increase in industrial activities promises especial interest in the meeting.

A business session will be held on the morning of May 8 and on the morning of May 9 will be held a session on machine shops, one on material handling in the steel industry, and one on the power test code.

On the morning of May 10 the subject of machine shops will be continued and the matter of fuels will be discussed. On Thursday, May 11, the sessions will cover management, power and welding.

Officers of American Engineering Standards Committee

At the adjourned annual meeting of the American Engineering Standards Committee held in New York on Feb. 9, Albert W. Whitney, a representative of the National Safety Council, was elected chairman, and George C. Stone, a representative of the American Institute of Mining and Metallurgical Engineers, was re-elected vice-chairman. Mr. Whitney is associate general manager of the National Bureau of Casualty and Surety Underwriters. A. A. Stevenson, the retiring chairman, is a representative of the American Society for Testing Materials.

COMING MEETINGS

March

American Society for Steel Treating. March 3. Sectional meeting, Hotel McAlpin, New York. Secretary, W. H. Eisenman, 4600 Prospect Avenue, Cleveland.

Refractories Manufacturers' Association. March 15, 16 and 17. Annual meeting, Chicago. Secretary, F. W. Donahoe.

Taylor Society. March 16 to 18. Midwinter meeting. City Club, Philadelphia. Managing director, Dr. H. S. Person, 29 West Thirty-ninth Street, New York.

April

National Metal Trades Association. April 19 and 20. Annual meeting, Hotel Astor, New York. Secretary, Louis W. Fischer, Peoples Gas Building, Chicago.

American Supply and Machinery Manufacturers' Association and Southern Supply & Machinery Dealers' Association. Joint Meeting. April 24 to 26, Birmingham. F. D. Mitchell, 233 Broadway, New York, is secretary of the American association and A. M. Smith, Smith-Courtney Co., Richmond, Va., is secretary of the Southern association.

Society of Industrial Engineers. April 26 to 28. Spring meeting, Hotel Statler, Detroit. George C. Dent, business manager, 327 S. La Salle Street, Chicago.

American Electrochemical Society. April 27 to 29. Spring meeting, Baltimore. Acting secretary, Dr. Colin G. Fink, 110 Park Avenue, New York.

May

Iron and Steel Institute. May 4 and 5. Annual Meeting, Quarters of Institution of Civil Engineers, London, England. Secretary, George C. Lloyd, 28 Victoria Street, S. W., London.

American Society of Mechanical Engineers. May 8 to 10. Spring meeting, Atlanta, Ga. Secretary Calvin W. Rice, 29 West Thirty-ninth Street, New York.

National Foreign Trade Council. May 10 to 12. Convention, Philadelphia. Secretary, O. K. Davis, 1 Hanover Square, New York.

National Sheet Metal Contractors' Association. May 15 to 19. Convention and exposition, Cadle Tabernacle, Indianapolis.

National Association of Purchasing Agents. May 15 to 20. Annual convention and exposition, Exposition Park, Rochester, N. Y. Secretary, H. R. Heydon, 19 Park Place, New York.

American Iron, Steel & Heavy Hardware Association. May 23 to 25. Annual meeting, Hotel Washington, Washington. Secretary, A. H. Chamberlain, Marbridge Building, New York.

HIGHER RATE ASKED

More Protection for Pig Iron Proposed—Slow Progress in Tariff Bill

WASHINGTON, Feb. 28.—Greater tariff protection for the American pig iron industry than is afforded in the Fordney bill, which carries the rate of $1.25 per ton, was urged before the Senate Committee on Finance last week by a delegation of manufacturers. The rate asked was not made known. At present pig iron is free. Under the Payne-Aldrich tariff it carried a duty of $2.50 per ton.

In asking that the rate in the House bill be increased, it was contended that the increased cost of labor and fuel, together with foreign competition, made a higher tariff rate necessary. It was further contended that if the bill is enacted as it now stands, the existence of the merchant iron industry in this country is endangered. It was stated that there is no probability of excessive prices because of a higher tariff rate, for domestic competition would take care of that phase. In order to keep the industry intact, pig iron must have the same degree of protection as that which is given to steel articles, it was stated.

The delegation was presented to the Finance Committee by Senator George Wharton Pepper and was accompanied by Harry S. McDevitt, Secretary to Gov. William C. Sproul, of Pennsylvania. The delegation consisted of Felton Bent of the Lebanon Iron Co.; Frank G. Kennery, of Philadelphia; John Milligan, of Dover; David Thomas of the Logan Iron Works, Philadelphia; Frank Richardson of Pittsburgh and William Clarke Mason of Philadelphia, counsel for the Philadelphia & Reading Coal & Iron Co.

Two Valuation Plans

The House Committee on Ways and Means and the Senate Committee on Finance have held conferences during the past week in an effort to wipe out their differences regarding the determination of a basis for tariff valuation. According to a tentative agreement, the Ways and Means Committee has scored a victory over the Finance Committee. This is contrary to the usual legislative history, for it is traditional that the Finance Committee does the disposing after letting the Committee on Ways and Means of the House do the proposing. The present success of the Committee on Ways and Means is attributed largely to the firm insistence of Chairman Fordney for an American valuation plan. Whether his attitude will prevail in the end or not, is a question, but sentiment in Congress seems to be supporting him.

The plan as now worked out calls for the basing of duties on the American wholesale selling price of imported articles where there are no comparable domestic articles and on the straight American valuation plan where there are comparable articles. In view of the fact that iron and steel products made in this country are comparable with practically all of those manufactured abroad, the straight American valuation plan would apply to iron and steel imports if the tentative agreement as to a valuation plan is made permanent.

The agreement is said not to be relished by Senator Smoot, of the Finance Committee, whose proposal to base duties upon a foreign valuation had been tentatively determined upon by the committee through a vote of 5 to 4. The Smoot proposal also took into account depreciated exchange and the idea of flexible tariffs, the latter providing that the President might proclaim minimum decreases of not less than, and maximum increases of not more than, 50 per cent. The idea of flexible tariffs might still be adopted, as the Administration has gone on record in favor of this plan.

Switching of One Vote

The change in the attitude of the Finance Committee in favor of the American valuation plan or its equivalent, for Chairman Fordney considers that the basing of duties on American wholesale selling prices is American valuation, was due to the switching of one vote in the Finance Committee. The result has been that while the first vote was 5 to 4 in favor of the foreign valuation plan, the latest test vote was 5 to 4 in favor of the American valuation plan. There still is said to be considerable feeling between some of the Republican Senators of the Finance Committee and the Republican Representatives of the Ways and Means Committee.

Members of Congress are hoping to adjourn in June and that is one reason why the Finance Committee cannot hold out as firmly as it would otherwise, for it recognizes that if the bill is to be passed by that time there would be a great deal of work to be done in the way of rewriting rates if the foreign valuation basis were adopted. On the other hand, if the House American valuation plan is continued, the rewriting of rates would be a much simpler matter. There is no assurance, however, that Congress will be able to adjourn in June and many seriously doubt that the tariff can be enacted by that time. Undoubtedly, it will be the object of heated and prolonged discussion in the Senate.

Gompers Plan Not Practical

WASHINGTON, Feb. 28.—Secretary of the Navy Denby, in a letter addressed to President Samuel Gompers of the American Federation of Labor, says that the Navy Department, upon investigation, has found it impossible to comply with suggestions recently made by a committee headed by Mr. Gompers for the relief of employees "furloughed" from the Navy Yard as a result of stopping work upon ships, effected by the Conference on the Limitation of Armaments. Secretary Denby points out that the Navy Department has no funds available for the scrapping of vessels and also that it has neither funds nor authority to proceed with an auxiliary building program to provide employment for the employees who have been dismissed.

Passing upon the proposal that the Government yards be used to supply the needs of other Government departments, Secretary Denby said that should such a plan be adopted and the yards converted into industrial instead of Government plants, "it is difficult to see how the national unemployment situation will be in any way alleviated, even if it is found feasible to compete in the open market with industrial plants on the outside. As to this I have very serious doubt, for I know of no industrial plant in private life where such liberality is shown employees thereby increasing the overhead, as in the Government yards of the United States."

The Secretary said, however, that the suggestions made by Mr. Gompers would be presented to President Harding, as suggested.

Making New Records

Production records are being established by the new 600-ton blast furnace of the Trumbull-Cliffs Iron Co., joint subsidiary of the Trumbull Steel Co., Warren, Ohio, and the Cleveland-Cliffs Iron Co., Cleveland. For the first 15 days of February, the average output was over 600 tons on an average of 1850 lb. of coke per ton of iron.

The stack was lighted Jan. 16 and in 36-hr. produced its first run of iron. In one week it was averaging over 500 tons each 24-hr. period. One day subsequently it produced 711 tons of iron on an average of 1675 lb. of coke per ton of iron, this production being attained without use of borings—on iron ore only.

The furnace supplies hot metal to the open hearth department of the Trumbull Steel Co., directly across the Mahoning river at Warren.

The Charter Oak Machine Co., 438 Asylum Street, Hartford, Conn., on or about April 1 will move into its new plant in East Hartford.

LEGAL POINTS DECIDED

Federal Trade Commission Makes Rulings in Basing Point Case

WASHINGTON, Feb. 28.—Denial was made last Saturday by the Federal Trade Commission of all of the motions presented by the counsel for the United States Steel Corporation with regard to the procedure of hearings in the so-called Pittsburgh base case. The motions were argued by the Steel Corporation through its general solicitor, W. W. Corlett, and Counsel Charles A. Severance. At the same time, the commission granted a motion by its own counsel, H. K. Steinhauer, to amend the complaint by including a statement that the Pittsburgh base practice is used by the steel producers other that the Steel Corporation and also to make one or two other minor changes, the object of which, it was stated, was to clarify the record. The commission directed John W. Bennett, before whom the hearings are being held, to admit all evidences such as the Steel Corporation asked to be excluded, but to note on the record all objections made by the Steel Corporation's counsel. Arguments were made on the motion before the commission last Friday.

The motions argued on behalf of the Steel Corporation which the commission denied were as follows:

1. For the commission to specifically instruct Examiner Bennett to exclude the introduction by the Federal Trade Commission of contracts, invoices, correspondence or other evidences of purchases, agreements as to purchases, quotations or offers to sell, made by corporations or individuals other than the respondents to purchasers and prospective purchasers of any of the rolled steel products involved; and further that all evidences of the same heretofore introduced be stricken from the record.

2. That the examiner exclude admission of testimonials, resolutions, etc., to State legislatures, chambers of commerce and other public bodies as to the method of marketing steel through the Pittsburgh base system.

3. That the Federal Trade Commission direct the examiner to admit evidences from the commission's witnesses regarding cost figures, etc.

The ruling of the commission means that Examiner Bennett will admit evidences such as has been heretofore put into the record but will be required to use discretion in the matter of permitting questions by the respondents directed to commission's witnesses as to cost figures, etc., of the steel consumers.

The noting of exceptions by the examiner is required evidently in anticipation of the well-known fact that the case before coming to final conclusion will be contested through the courts and perhaps will finally reach the Supreme Court of the United States.

While the ruling by the commission makes it clear that the past procedure in the hearings can be continued but in a sense may clarify the record as suggested, it is plain that the record will be made extremely cumbersome because of the large volume of testimony that may be introduced, but to which exceptions may be noted by counsel for the Steel Corporation. The ruling of the commission also is interesting in view of the argument made by its general counsel, W. H. Fuller, that the commission did not have jurisdiction to rule on the motion. He contended that jurisdiction rests with Circuit Court of Appeals and therefore that the commission to attempt to pass on the motion would be to usurp the authority of the courts. This argument, however, was combatted by Mr. Severance.

The hearing will be resumed at Minneapolis this week.

Tensile Properties of Some Structural Alloy Steels at High Temperatures

In Technologic Paper No. 205 of the Bureau of Standards, the results are given of a number of determinations of tensile strength, proportional limit, elongation, reduction of area, and strength at fracture throughout the range 20 to 500 deg. C for four steels containing about 0.38 per cent carbon as follows: (a) Plain carbon steel; (b) 3.50 per cent nickel steel; (c) 3 per cent nickel and 1 per cent chromium steel, and (d) one per cent chromium 0.2 per cent vanadium steel. Brief reference is made to the types of fractures made in testing steels at various temperatures, and particular attention is paid to comparison of the tensile properties of these alloys at 550 deg. C. Of the four steels tested in normalized conditions, it appears that the two alloys containing chromium show greater resistance to weakening by increase in temperature to about 550 deg. C than either the plain carbon or 3.50 per cent nickel steels, and at this high temperature the chromium-vanadium steel is to be preferred from the standpoint of high tensile strength and limit of proportionality. The carbon and 3.50 per cent nickel steels behaved alike with rise in temperature above that of the room and at about 550 deg. C the addition of 3.50 per cent nickel appears to have but little effect upon the strength of the carbon steel.

Glenwood Motor Car Co.'s Plans

The Glenwood Motor Car Co., organized by Cleveland interests, has purchased a 15-acre tract along the Youngstown & Austintown Railroad in Youngstown, Ohio, where it plans to build a plant in the spring for production of a six-cylinder automobile. Initial unit will be a standard structural steel factory building 90 x 750 ft. During the first year of production, the company plans to turn out 500 cars, and at the end of the first 12 months to go on a five-car-a-day basis.

The company, organized under the laws of the State of Delaware, has an authorized capitalization of $5,000,000 preferred stock and 200,000 shares of non-par value common. Officers are: B. J. Cline, president and general manager; Capt. R. L. Quiesser, president of the R. L. Quiesser Co., Cleveland, secretary, and T. D. Lamb, president of the Hess Body Co., Cleveland, treasurer. Mr. Cline has had 22 years' experience in the automobile industry, and was formerly indentified with the Chandler and Chalmers interests.

Railroad Operation in 1921

According to figures issued by the Association of Railway Executives, the total operating revenue of the 201 Class I roads for 1921 was $5,569,888,000, or 10.6 per cent less than for 1920. The corresponding operating expenses are given as $4,602,425,000, or 21.1 per cent less than in 1920. The operating ratio works out at 82.63 per cent, compared with approximately 70 per cent normal in pre-war times.

After taking care of various fixed charges, the net operating income available for interest, dividends, rentals and surplus amounted to $615,625,619, or 3.31 per cent of the $18,600,000,000 tentative valuation of the roads. Returns became better throughout the year, the December estimate being at the rate of 3.44 per cent.

Freyn, Brassert & Co.'s Foreign Connections

In the interview with H. J. Freyn, president Freyn, Brassert & Co., Chicago, in THE IRON AGE, Feb. 16, it should have been made clear that the Chicago company has a working agreement with the German steel company, Gutehoffnungs Hütte, to represent its interests in Germany and other Central European countries; that the American rights to the McKune open-hearth furnace belong to the Miami Metals Co., Chicago, and not to Freyn, Brassert & Co., but that the latter company has secured an option on certain foreign rights to this invention. An error was made in stating that the cost of living and wages in Germany are respectively 25 and 30 per cent higher than before the war; they are 25 and 30 times higher respectively. Also German combinations are now becoming vertical instead of horizontal as before the war.

Iron and Steel Markets

OPERATIONS EXPANDED

Industry at 55 Per Cent Basis

Backlogs Obtained at Expense of Prices — Railroad Purchases Notable

Further expansion of steel making activities marked the last days of February. The gradual increase in production has been larger than tonnage sales would have indicated and shows how pressing are the necessities of the stock-bare consumers.

The increase of bookings has been accompanied by fresh weaknesses in price. The resultant unsettlement is thus still holding back a large volume awaiting evidence of price stabilization.

The United States Steel Corporation is making between 60 and 65 per cent of its capacity in steel; the independent makers, as a whole, are operating at nearly 50 per cent, and March opens at a 55 per cent rate for the whole country.

There is practically no contracting for future needs; there is little extension of delivery dates, and business is chiefly for prompt shipment, about the only buying for second quarter needs being in sheets and in pig iron.

Attempts are being made to stiffen prices, partly by refusal to bid at current quotations. In the case of wire a 10c. advance is general, reducing the spread between plain wire and wire nails.

Current activities of wire plants are not fully accounted for by mill bookings. Pipe mills, likewise well engaged, are in some cases stocking production. There is an unusually full engagement of tin plate mills, largely on old contracts. About 75 per cent of the sheet mill capacity of the country is in operation and sheet prices are among the few remaining firm, though buyers are not overlooking the weakness in other products.

The considerable number of price reductions with the broadening in consumption are accounted for in part by the concern shown by mills over building up backlogs. In the heavy tonnage products 1.35c., Pittsburgh, for bars, plates and shapes has been established. Tin plate is obtainable at $4.50 and $4.60 per box, against recent quotations of $4.75. Frequent steep price concessions in steel pipe point to the possibility of a new card of discounts to bridge the difference between quoted and actual selling prices.

An inquiry of the New York Central for 40,000 to 50,000 spikes brought out a price of $2 per 100 lb., against $2.15 recently obtaining. Heavy rivets have been done at $2 and $2.10, though quoted 10c. higher. Cold-finished bars are now readily obtained at 1.90c., and $2 concessions are noted on hoops and $3 on bands.

The pig iron market in the East has shown a decided increase in activity. Sales of foundry iron in the Philadelphia district have amounted to fully 40,000 tons, largely to cast iron pipe and soil pipe manufacturers, while in New York the sales were about 25,000 tons of foundry grades to cast iron pipe and other consumers. Concessions of about $1 a ton were made, but the prices have since recovered. Charcoal iron has declined about $4 per ton in the Chicago district, and owing to strong competition between Northern and Southern foundry grades, the recently named price of $20 has been shaded 50c.

Increased melting has been an important factor in the pig iron buying, but so has the fear of a coal strike, with an upward tendency in the price of furnace coke and an actual advance in foundry coke.

In the large tonnage business the railroads are still conspicuous. Fresh rail purchases total 65,000 tons, including 20,000 for the Reading, 10,000 for the Atlantic Coast Line, 10,000 for the Santa Fe and 5000 for the Northern Pacific, and releases on existing contracts have been increasingly liberal. Upward of 15,000 tons of tie plates and splice bars, mostly for the Burlington, was bought in the West.

New car orders total 5300, again all business for Western car builders. Included are 500 more for the Burlington (completing its purchases of 7300 cars), 3300 for the Pacific Fruit Express and 1000 for the Great Northern. Of new business in locomotives the Burlington bought 55 of the 60 placed.

In the broadening market in which freer buying is noted from the automobile industry and even from the agricultural implement manufacturers, alloy steel is in notably better demand.

Pittsburgh

PITTSBURGH, Feb. 28.

Business in steel is better, but seemingly there is more anxiety on the part of manufacturers for orders than there is urgency about the demand, because the larger bookings have been accompanied by fresh weakness in prices in which few products have escaped, and which is really pronounced in the heavy tonnage lines. Some describe the price situation as more unsettled now than it has been at any time since the reaction began late in 1920.

Most of the recent developments of a character affecting the demand for steel have been favorable and there has been some actual broadening in the demand, but some mills evidently have been more concerned about the building up of a back log than in maintaining prices and have not hesitated about naming figures that would bring the orders. It is reported that a large tonnage of structural steel recently was placed in the East, at less than 1.30c., Pittsburgh, while a Pittsburgh maker of bolts and nuts is mentioned as having closed for a substantial tonnage of bars at 1.30c., base and 1.35c. has come to be regarded as a maximum instead of a minimum price on plates, shapes and bars.

Price concessions in steel pipe have been so frequent and so steep lately as to give rise to expectation of the issuance of a new card bridging the differences which now exist between quoted and actual selling prices. Tin plate prices are weaker and increased orders for most other finished products have been accompanied by weakness in prices. There is a firmer stand by wire manufacturers who, however, have given public recognition to a base of $2.40 per keg for nails, and to the lower prices they recently were quietly accepting on other products from preferred customers. No important price cutting is noted in sheets, but it is not

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	Feb. 28, 1922	Feb. 21, 1922	Jan. 31, 1922	Mar. 1, 1921
No. 2X, Philadelphia‡	*$20.34*	$21.34	$21.34	$28.34
No. 2, Valley furnace†	**19.00**	18.75	19.00	26.50
No. 2, Southern, Cin'ti†	20.00	20.00	20.50	31.00
No. 2, Birmingham, Ala.†	15.50	15.50	16.00	26.50
No. 2 foundry, Chicago*	*19.50*	20.00	18.50	27.00
Basic, del'd, eastern Pa.	19.84	19.84	19.84	27.26
Basic, Valley furnace	17.75	17.75	18.00	25.00
Bessemer, Pittsburgh	21.46	21.46	21.46	28.96
Malleable, Chicago*	20.00	20.00	18.50	26.50
Malleable, Valley	19.00	19.00	19.50	27.00
Gray forge, Pittsburgh	20.71	20.71	20.96	27.46
L. S. charcoal, Chicago	*26.00*	30.50	30.50	38.50
Ferromanganese, seaboard	62.50	62.50	58.35	90.00
Rails, Billets, etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$40.00	$40.00	$40.00	$47.00
Bess. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. billets, Pittsburgh	28.00	28.00	28.00	38.50
O.-h. sheet bars, P'gh	29.00	29.00	29.00	42.00
Forging billets, base, P'gh	32.00	32.00	32.00	43.50
O.-h. billets, Phila.	33.74	33.74	33.74	49.24
Wire rods, Pittsburgh	**36.00**	35.00	36.00	52.00
	Cents	Cents	Cents	Cents
Skelp, gr. steel, P'gh, lb.	*1.40*	1.50	1.50	2.35
Light rails at mill	1.40	1.40	1.50	2.45
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	1.76	1.76	1.81	2.70
Iron bars, Chicago	1.55	1.55	1.60	2.60
Steel bars, Pittsburgh	*1.35*	1.40	1.50	2.00
Steel bars, Chicago	1.50	1.50	1.60	2.38
Steel bars, New York	*1.73*	1.78	1.83	2.38
Tank plates, Pittsburgh	*1.35*	1.40	1.40	2.10
Tank plates, Chicago	1.50	1.50	1.60	2.48
Tank plates, New York	*1.73*	1.78	1.78	2.48
Beams, Pittsburgh	*1.35*	1.40	1.50	2.10
Beams, Chicago	1.50	1.50	1.60	2.48
Beams, New York	*1.73*	1.78	1.83	2.48
Steel hoops, Pittsburgh	*1.80*	1.90	1.90	2.80

*The average switching charge for delivery to foundries in the Chicago district is 70c. per ton.
†Silicon, 1.75 to 2.25. ‡Silicon, 2.25 to 2.75.

Sheets, Nails and Wire,	Feb. 28, 1922	Feb. 21, 1922	Jan. 31, 1922	Mar. 1, 1921
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 28, P'gh	3.00	3.00	3.00	4.00
Sheets, galv., No. 28, P'gh	4.00	4.00	4.00	5.25
Sheets, blue an'l'd, 9 & 10	2.25	2.25	2.25	3.20
Wire nails, Pittsburgh	2.40	2.40	2.50	3.10
Plain wire, Pittsburgh	**2.25**	2.15	2.25	3.00
Barbed wire, galv., P'gh	3.05	3.05	3.15	3.85
Tin plate, 100-lb. box, P'gh	*$4.60*	$4.75	$4.75	$7.00
Old Material, Per Gross Ton:				
Carwheels, Chicago	$15.00	$15.00	$15.00	$19.00
Carwheels, Philadelphia	16.50	16.50	16.50	20.00
Heavy steel scrap, P'gh	**15.00**	14.00	14.00	15.00
Heavy steel scrap, Phila.	12.00	12.00	12.00	13.50
Heavy steel scrap, Chicago	11.50	11.50	11.25	14.00
No. 1 cast, Pittsburgh	16.00	16.00	16.00	22.00
No. 1 cast, Philadelphia	16.50	16.50	16.50	23.00
No. 1 cast, Ch'go (net ton)	13.50	13.50	13.00	16.75
No. 1 RR. wrot, Phila.	**15.00**	14.50	14.50	18.00
No. 1 RR. wrot, Ch'go (net)	**10.75**	10.50	10.50	13.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$3.25	$3.25	$2.75	$4.50
Foundry coke, prompt	**4.25**	4.00	3.75	5.50
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	*12.75*	13.00	13.62½	13.00
Electrolytic copper, refinery	*12.50*	12.75	13.37½	13.50
Zinc, St. Louis	**4.55**	4.50	4.50	4.75
Zinc, New York	**4.90**	4.85	4.85	5.10
Lead, St. Louis	4.40	4.40	4.40	3.90
Lead, New York	4.70	4.70	4.70	4.00
Tin (Straits), New York	**29.75**	29.62½	32.00	30.00
Antimony (Asiatic), N. Y.	*4.35*	4.40	4.40	5.20

The prices in the above table are for domestic delivery and do not necessarily apply to export business.

Composite Price, Feb. 28, 1922, Finished Steel, 1.998c. Per Lb.

Based on prices of steel bars, beams, tank plates, plain wire, open-hearth rails, black pipe and black sheets — These products constitute 88 per cent of the United States output of finished steel.

Feb. 21, 1922,	2.005c.
Jan. 31, 1922,	2.048c.
Mar. 1, 1921,	2.793c.
10-year pre-war average,	1.689c.

Composite Price, Feb. 28, 1922, Pig Iron, $18.10 Per Gross Ton

Based on average of basic and foundry irons, the basic being Valley quotation, the foundry an average of Chicago, Philadelphia and Birmingham

Feb. 21, 1922,	$18.35
Jan. 31, 1922,	18.31
Mar. 1, 1921,	26.14
10-year pre-war average,	15.72

denied that the weakness in other lines constitutes a menace to the sheet price structure.

Plant activities still are on a rising scale in this and nearby districts, but the gain has been greatest among the independent units, it being noted that some of the Steel Corporation subsidiaries have not done so well in the past week as in the week before. Independent plants as a whole easily are operating 50 per cent and some are running practically full, among the latter being the Weirton Steel Co., and the Trumbull Steel Co., while the Republic Iron & Steel Co. has 10 of its open-hearth furnaces on, and to-morrow will light another one. The Carnegie Steel Co. has turned the blast on two furnaces and now is operating 28 out of a total of 59 stacks. Sheet mill operations are close to 75 per cent of capacity, taking the industry as a whole, and there is unusual full engagement of tin plate mills, in this and nearby districts. Pipe mills also are well engaged, but there is some stocking of this product and current activities of wire plants are not fully accounted for by the mill booking.

The threatened strike of union coal miners also is something of a factor in present operations.

This market has grown slightly firmer on foundry pig iron, but there has not been enough done to establish changes in other grades. The coke market finds support from the fact that there is a market for coal at slightly better returns than are netted by coke at current prices. The market distinctly is stronger on the steel works grades of scrap, largely as a result of purchases by mills outside Pittsburgh which have not been adding to pig iron production.

Pig Iron.—There is a fair amount of activity in foundry iron, sales by one furnace interest over the past week having amounted to about 4000 tons, and prices have stiffened slightly. Practically all of the business placed has been at $19, furnace, for No. 2 grade, and seemingly no more iron is available at a lower figure. It develops that the recent purchase of 1000 tons of basic by a Pittsburgh district sheet maker was from a Valley steel works furnace and that the price was $17.75. Most producers now are quoting $18 as a minimum, but there has been no business up

to determine whether that price can be obtained. Furnance interests generally are holding Bessemer iron at $19.50, but this price is merely nominal and it is doubtful if it could be obtained on sizable tonnages. Stocks of this grade, however, are pretty light and since production is nil, there is not much pressure to sell. Carload lot sales have been done anywhere from $19 to $19.50. W. P. Snyder & Co. make the average price of basic iron from Valley furnaces for February $17.75 as compared with $18.1875 in January, and of Bessemer $19.50, as against $19.594 in January.

We quote Valley furnace, the freight rate for delivery to the Cleveland or Pittsburgh district being $1.96 per gross ton:

Basic	$17.75 to $18.00
Bessemer	19.00 to 19.50
Gray forge	18.75
No. 2 foundry	19.00
No. 3 foundry	18.75
Malleable	19.00

Ferroalloys.—Principal activity centers in spiegeleisen. The purchase of a Valley steel maker turns out to be 600 tons instead of 100 tons as first reported. This was 16 to 19 per cent material and the price was approximately $30 delivered, Youngstown. The source of the supply is not disclosed. A central Ohio steel maker has closed for about 1000 tons of the same grade, but this interest paid $30 furnace, or slightly more than $37 delivered, the seller being a commercial producer. Both sales were spot tonnages for prompt delivery, and because of meager stocks, the market is stronger for early than future deliveries. It is currently reported that an Eastern maker has booked a considerable tonnage of 20 per cent material for future shipment around $25 furnace, and will start up a furnace shortly. A central Ohio consumer has an inquiry out for 500 tons of 80 per cent ferromanganese, and claims to have a quotation of $2 per ton below the price now quoted by American and English producers. It is hard to establish $62.50 seaboard, for this material because so many consumers were covered prior to the advance. German makers have not yet advised sales agents of any change in prices and we continue the quotation of $58.35 seaboard, for 80 per cent. The market for 50 per cent ferrosilicon is quiet. A requirement contract covering the remainder of this year is said to have been made by a Pittsburgh consumer at $57 furnace, freight allowed. Spot tonnages are available at $55 to $56 for domestic material.

We quote 78 to 82 per cent ferromanganese, $62.50 c.i.f. Atlantic seaboard for domestic and English and $58.35 for German. Average 20 per cent spiegeleisen, nominal; 16 to 18 per cent, $30 to $35, delivered Pittsburgh or Valleys; 50 per cent ferrosilicon, domestic, $55 to $60 furnace, freight allowed. Bessemer ferrosilicon is quoted f.o.b. Jackson and New Straitsville, Ohio, furnaces as follows: 10 per cent, $36.50; 11 per cent, $39.80; 12 per cent, $43.10; 13 per cent, $47.10; 14 per cent, $52.10; silvery iron, 6 per cent, $25; 7 per cent, $26; 8 per cent, $27.50; 9 per cent, $29.50; 10 per cent, $31.50; 11 per cent, $34; 12 per cent, $36.50. The present freight rate from Jackson and New Straitsville, Ohio, into the Pittsburgh district is $4.06 per gross ton.

Billets, Sheet Bars and Slabs.—There is a larger movement against contracts but open market transactions still are few and small. The market is not quotable above $28, Pittsburgh or Youngstown, with freight equalized to point of consumption, for large billets. The last reported business in sheet bars was at $29, Pittsburgh, but the difference in freight between Pittsburgh and Youngstown to destination was absorbed by the seller. There is an impression that on a sizable tonnage $28 could be done on billets, sheet bars and slabs.

We quote 4 x 4-in. soft Bessemer and open-hearth billets at $28; 2 x 2-in. billets, $29; Bessemer and open-hearth sheet bars, $29; slabs, $28; forging billets, ordinary carbons, $32, all f.o.b. Youngstown or Pittsburgh mills.

Wire Rods.—Makers who recently went as low as $35 for the base size of soft rods appear to be unwilling to longer entertain that price and now are quoting $36, while some claim to have turned down business at the latter figure. There is little business and the market is interested at the new price. Prices are given on page 617.

Steel Skelp.—Hardly enough is being done to establish prices, but it is admitted by some makers that an order carrying a price of 1.40c. would not be declined. Indeed, that price has been named on some recent inquiries and there seems to be no justification for quoting a higher price with plates readily available at 1.40c. and most makers in a position to roll skelp.

Wire Products.—Recent developments in connection with prices have been along the line of setting up double quotations, with the result that there now is one list for the quantity buyers and another and higher one for the small or intermittent purchaser. Nails are quoted publicly at $2.40 base per 100-lb. keg, to the large buyer, while to those buying only occasional carloads an effort is being made to hold to $2.50. There is a like spread in other products. Business is better than it was earlier in the year, but by comparison with other years, even prewar years, it makes a rather poor showing for this season, unusually marked by heavy orders and by the mills being several weeks behind in their deliveries. Today's situation is that the mills are well abreast of their orders and some actually could anticipate the needs of their customers.

We quote wire nails at $2.40 base per keg, Pittsburgh, and bright basic and Bessemer wire at $2.25 base per 100 lb., Pittsburgh.

Steel Rails.—There is more activity in light rails, due to the fact that the union coal mine operators, anxious to get out as much coal and to do as much development work as possible prior to April 1, are buying. Orders run small individually, but reach a fair aggregate. There has been no betterment in prices, because business is not sufficient to give all a share and competition between makers still is sharp. Light sections rolled from billets are quoted at 1.40c. to 1.45c. base, but the lower figure is more common, because rerolled rails can be bought at 1.35c. base or less, and frequently from mills having favorable freight rates to destination.

We quote 25 to 45-lb. sections, rolled from new steel, 1.40c. to 1.45c. base; rolled from old rails, 1.35c. base; standard rails, $40 per gross ton mill for Bessemer and open-hearth sections.

Iron and Steel Bars.—Demand for steel bars is better and includes some tonnages of fair size, one being for 300 tons from a Pittsburgh maker of railroad track tools, but accompanying the revival of interest on the part of buyers has been an effort on the part of some makers to accumulate a back log and considerably lower prices than recently prevailed have been named. An unconfirmed report has it that a Pittsburgh maker of bolts and nuts was able to place a fair sized tonnage at 1.30c., Pittsburgh. This appears to be below the average price idea of most makers, although in conjunction with plates and shapes that price is known to have been made on bars. There still is talk of 1.40c., but it is regarded as a negotiation quotation and applicable only on resale lots. The going market is 1.35c. base on both mild and reinforcing bars, but is weak and less can be done on large lots. Makers of iron bars here have made no change in prices.

We quote steel bars rolled from billets at 1.30c. to 1.40c.; reinforcing bars, rolled from billets, 1.30c. to 1.40c. base; reinforcing bars, rolled from old rails, 1.25c. to 1.30c.; refined iron bars, 2c. to 2.10c. in carloads, f.o.b. mill, Pittsburgh.

Structural Material.—Fabricating interests in this district continue to report a good inquiry, it being the experience of one that inquiries over the past week have been most numerous of any week in fully a year. Awards, however, are not in keeping with the inquiry, as there have been only a few involving more than 100 tons. The Pittsburgh-Des Moines Steel Co. has taken 150 tons for a school in Stowe township, Pa., while the Jones & Laughlin Steel Co. has the order for 125 tons for a shop building for the Columbus Mill & Mine Supply Co., Columbus, Ohio, and will fabricate 100 tons for the National Brick Co., Chicago. As intimated in these columns a few weeks ago, the Mellon-Stuart Co., Pittsburgh, has been awarded the general contract for the construction of a new four-story building for the Mellon National Bank, Pittsburgh, and the order for the steel aggregating between 1600 and 1700 tons is expected to be let shortly. On the bulk of current business in plain material, this market is quotable 1.35c. to 1.40c., but there is an impression that sizable projects will bring out a lower price. Prices are given on page 617.

Sheets.—Business continues to gain and there is a better engagement of mill capacity than before since last fall. The great bulk of the orders are for early shipment, but some second quarter deliveries are reported in the orders recently received by the Steel Corporation sheet making subsidiaries. Galvanized sheets figure prominently in the orders, and there also have been some good bookings of blue annealed sheets. In the main, there is pretty close observance of regular quotations, and it is claimed that even on the heavier gages of blue annealed sheets the regular base of 2.25c. is obtained more frequently than recently was the case. Buyers, however, are not overlooking the weakness in other products and continue their efforts to depress sheet prices. Quotations are given on page 617.

Plates.—Fair demand is coming out from tank builders, but competition among mills for a share of the business is resulting in low prices. We note one sale of 750 tons at about 1.35c., Pittsburgh, but on account of the milling and transit privilege the net cost to the buyer will fall well under that figure. Makers still are quoting 1.40c., Pittsburgh, for tank quality plates, but 1.35c. is the more common price against inquiry involving fair sized tonnages.

We quote sheared plates, ¼ in. and heavier, tank quality, at 1.35c. to 1.40c., f.o.b. Pittsburgh.

Iron and Steel Pipe.—There is a gradual, but steady improvement in orders for steel pipe, but the gain seems to go hand-in-hand with lower prices than recently have prevailed. The usual supplementary discounts on merchant pipe of one point and 5 and 2½ per cent have been extended by additional concessions of 2½ to 5 per cent. In oil country goods and line pipe, the competition for orders is even keener than in merchant pipe and prices are largely in favor of buyers. It will be no surprise if a new card naming lower prices soon is issued. Lower prices seem immediately ahead for wrought iron pipe as the present great spread between it and steel pipe retards business. Card discounts are given on page 617.

Boiler Tubes.—Business is better but not good and as far as prices of steel tubes are concerned the market is very unsatisfactory. Competition is so sharp that quotations have only a remote relationship to actual selling prices. Card discounts are given on page 617.

Tin Plate.—Independent mills in this and nearby districts are running at an extremely high rate. Full engagement is noted of the mills of the Jones & Laughlin Steel Co., the Weirton Steel Co., the McKeesport Tin Plate Co., the Standard Tin Plate Co., the Trumbull Steel Co. and almost full occupation of some of the smaller units. Specifications on old contracts rather than new business account for this condition. There has not been much foundation in recent important sales for a quotation of $4.75, this being an "official" or basing quotation, and the large tonnage orders having been placed at around $4.60. Even less than this is reported to have been done on Pacific Coast Business, while the export market lately has been around $4.

We quote standard production coke tin plate, $4.60 per base box f.o.b. Pittsburgh for carload lots.

Cold-Finished Steel Bars and Shafting.—The market is holding fairly well at around 1.90c. base, Pittsburgh, despite the fresh weakness in hot-rolled bars, and the fact that demand for cold-finished bars is of moderate proportions. Buyers merely are replacing stocks sold and no very large orders are coming out. Ground shafting is unchanged at 2.25c. base, mill, for carload.

Hoops and Bands.—Business is slightly better, but by no means good, buyers still being cautious on account of the uncertainty of prices. Makers are asking 1.90c. on both hoops and bands, but concessions of $2 per ton on hoops and of $3 on bands are not hard to obtain.

Hot-Rolled and Cold-Rolled Strips.—Cold-rolled strips still are fairly firm at $3.50 base, Pittsburgh, but the market in hot-rolled strips leans in buyers' favor. The official quotation on the latter is 2c. base, Pittsburgh, but the bulk of the business is carrying prices of from 1.80c. to 1.90c., and preferred buyers are able to place their orders below the lower figure. Business as a whole shows improvement.

Nuts and Bolts.—Makers in this district fail to detect any appreciable improvement in either the demand or orders. Buyers still are taking on only their actual needs. Discounts are given on page 617.

Rivets.—The market still is dull and weak. Large makers still are holding to $2.25 to $2.35 for heavy rivets, but this seems to be solely for the purpose of protecting outstanding contracts, for business recently has been done as low as $2 and $2.10. A full range of prices now is $2 to $2.25 on large structural rivets and $2.10 to $2.35 on large boiler rivets. Some still are quoting small rivets at 70, 10 and 10 off list. Prices and discounts are given on page 617.

Spikes.—The recent inquiry of the New York Central Lines for 40,000 to 50,000 kegs of standard spikes brought out a quotation of $2 per base 100 lb., and this now is regarded as the market for large lots. On smaller tonnages the common quotation is $2.10 base per 100 lb. Small spikes also are weaker by about $2 per ton. Prices are given on page 617.

Coke and Coal.—Stocking of coal in anticipation of a strike of the union miners on April 1 continues, and while prices have not advanced materially as a result, it is more profitable for Connellsville operators to ship coal than coke. Since a number of Connellsville ovens which started up on the recent flurry in coke prices have been put out, there is a dearth of spot tonnages of coke, and prices show considerable firmness. Little furnace coke now is obtainable as low as $3.25 per net ton, oven, and the more common price range is from $3.40 to $3.50. The New Jersey Zinc Co. recently closed for 6000 to 9000 tons a month for the remainder of this year. This company is about to start up one of its furnaces at Hazard, Pa., on spiegeleisen. Spot tonnages of foundry coke now range from $4.25 to $4.50 per net ton, ovens, with the demand good and offerings light. The coal market now is quotable from $1.50 to $1.85, and mine run non-union steam coal from $2 to $2.10 for union coal of this grade and $1.65 to $2 for mine run by-product coal, and from $2.25 to $2.40 for mine run gas coal.

Old Material.—Prices of open-hearth grades have moved up sharply in the past week. Valley steel makers, in receipt of larger orders, have not been adding to their pig iron output, but rather have been increasing their melt of scrap and lately have been rather free buyers, paying up to $5.50 for heavy melting grade. Other mills outside of Pittsburgh also have been buying and paying prices well above the Pittsburgh levels. The result is that little material has been coming through and the entrance of a Pittsburgh independent into the market for a round tonnage developed that nothing was available at less than $15. Sales actually have been made at $15.50 and the advance in this grade has sympathetically strengthened other open hearth material. Machine shop turnings are up slightly with some business noted at $10.25 this district. Compressed sheets of the Westinghouse Electric & Mfg. Co. for shipment next month, are reported to have been sold at $11,75, East Pittsburgh.

We quote for delivery to consumers' mills in the Pittsburgh and other districts taking the Pittsburgh freight rate, as follows:

Heavy melting steel, Steubenville, Follansbee, Brackenridge, Monessen, Midland and Pittsburgh	$15.00 to $15.50
No. 1 case, cupola size	16.00 to 16.50
Rerolling rails, Newark and Cambridge, Ohio; Cumberland, Md.; Huntington, W. Va., and Franklin, Pa.	15.00 to 15.50
Compressed sheet steel	12.50 to 13.00
Bundled sheets, sides and ends	11.50 to 12.00
Railroad knuckles and couplers	15.50 to 16.00
Railroad coil and leaf springs	15.50 to 16.00
Low phosphorus standard bloom and billet ends	17.00 to 17.50
Low phosphorus plates and other grades	16.50 to 17.00
Railroad malleable	13.00 to 13.50
Iron car axles	23.00 to 24.00
Locomotive axles, steel	21.00 to 22.00
Steel car axles	15.50 to 16.00
Cast iron wheels	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Machine shop turnings	9.75 to 10.25
Sheet bar crop ends	14.50 to 15.00
Heavy steel axle turnings	11.50 to 12.00
Short shoveling turnings	11.00 to 11.50
Heavy breakable cast	14.50 to 15.00
Stove plate	12.50 to 13.00
Cast iron borings	11.00 to 11.50
No. 1 railroad wrought	11.50 to 12.00

Chicago

CHICAGO, Feb. 28.

A slow but steady betterment in demand is dissipating the gloom which has hung over the steel market for many months, and is causing the trade to look forward to the future with confidence. Purchases by railroads and industries serving the railroads such as car builders and various supply manufacturers show no signs of letting up. New orders for cars placed with Western shops within the past fortnight total 5300. Heavy purchases of track materials are being made and rail specifications are increasingly liberal. New orders for rails include 10,000 tons for the Santa Fe and 5000 tons for the Northern Pacific, both of which were placed with the Colorado mill. A number of the carriers are in the market for bridge steel and a current inquiry from the Great Northern calls for 1000 tons of reinforcing bars.

Demand from other consumers of steel is also broadening, indicating increasing industrial activity and greater confidence in current prices. While most of this buying is for replenishment purposes, it is to be noted that mill deliveries are not quite so prompt as heretofore and some users are buying as far as 60 days ahead. Manufacturers serving the automobile industry are buying more freely and even farm implement makers are placing some orders, although they still have hang-over stock of raw material. The latter are in a much more cheerful mood because of the advance in the grain market.

The mills have maintained the gains in operation reported last week and further improvement is looked for. The Illinois Steel Co. has 12 active blast furnaces and is producing steel at 55 per cent of ingot capacity. The Inland Steel Co. is on a 60 per cent basis, but will increase its active capacity this week when its rail mill starts.

Pig Iron.—The market is on an uncertain footing. On the one hand, a number of orders have been taken at the new local price of $20, base, furnace, notable among them being 300 tons of foundry for a Fox River Valley melter and 500 tons of foundry for second quarter shipment to a Michigan plant. On the other hand, Northern iron has come into competition with the Southern furnace which is now shipping by water and rail, and in a few instances concessions below the local price have resulted. Thus a local melter bought 150 tons of foundry at $19.50, base, or $20.20 delivered, estimating the switching charge at 70c. On this same inquiry the Southern furnace quoted $20.27, delivered. The latter producer, however, has since advanced its price 50c., bringing the Chicago delivered price up to $20.77, delivered. On 300 tons of foundry for delivery at Omaha, the delivered price figured back to $18.50, base, Chicago furnace. This sale also was made in competition with Southern iron. Even those Southern furnaces which do not enjoy the benefit of a combination water and rail rate are making sales in certain parts of Chicago territory, notably Indiana and Michigan. One producer took four orders in Indiana during the past week, totaling 900 tons, at $15.50, base, Birmingham. Inquiry is rather liberal, but buying is on the whole limited. Some melters who have put out inquiries are apparently unconvinced that the recent advance in local iron will hold and are therefore delaying their purchases. The Chain Belt Co., Milwaukee, wants 2000 tons of malleable and the Manufacturers' Foundry Co. and the Koehring Machine Co. of the same city are inquiring for 2000 tons and 500 tons of foundry respectively. The Walworth Mfg. Co. is in the market for 1600 to 2400 tons of foundry, and a Chicago company with plants at various points wants 3500 tons of foundry and malleable. A sale of 500 tons of resale, copper free low phosphorus was made at $34.50, delivered. Furnace prices on low phosphorus, however, are firm. Charcoal iron has receded to $22.50, base, furnace, a large producer having named this price. This reduction puts the charcoal product on a strictly competitive basis with coke iron at numerous consuming points.

Quotations on Northern foundry, high phosphorus malleable and basic irons are f.o.b. local furnace and do not include a switching charge averaging 70c. per ton. Other prices are for iron delivered at consumers' yards, or when so indicated, f.o.b. furnace other than local.

Lake Superior charcoal, averaging sil. 1.50, delivered at Chicago		$26.00
Northern coke, No 1, sil. 2.25 to 2.75	$20.00 to	20.50
Northern coke, foundry, No. 2, sil. 1.75 to 2.25	19.50 to	20.00
Northern high phos		20.00
Southern foundry, sil. 1.75 to 2.25		20.77
Malleable, not over 2.25 sil		20.00
Basic		20.00
Low phos., Valley furnace, sil. 1 to 2 per cent copper free		30.00
Silvery, sil. 8 per cent		32.82

Ferroalloys.—Except for a few carload sales the market is inactive.

We quote 78 to 82 per cent ferromanganese, $70.90, delivered; 50 per cent ferrosilicon, $56 to $57.50, delivered; spiegeleisen, 16 to 18 per cent, $40.10, delivered.

Railroad Equipment.—The Pacific Fruit Express has placed orders for 2600 refrigerator cars with the Standard Steel Car Co., and 700 cars of the same type with the General American Car Co. The Great Northern has made the following additional purchases: 500 gondola cars from the Western Steel Car & Foundry Co., and 500 stock cars from the Pullman Co. The Chicago & North Western is expected to issue a formal inquiry this week for 3000 or more cars, including box, flat, gondola and refrigerator cars. The Burlington has placed 500 automobile cars with the Pullman Co., this being the last purchase against its inquiry for 7300 cars. This road has also ordered 47 locomotives from the Baldwin Locomotive Works and eight from the Lima Locomotive Co. A formal inquiry for 1000 box cars has been put out by the St. Paul.

Steel Castings.—The placing of 3300 cars by the Pacific Fruit Express and 1500 cars by the Great Northern will result in considerable business for castings manufacturers. The steel castings for the Burlington cars have not yet been placed. Outside of railroad car business, there is little castings work in prospect. An Eastern steel foundry owned by a shipbuilding concern has shut down. Although some instances of shading on the Eastern seaboard are reported, prices are rather generally on a parity with those published on pages 348 and 350 of THE IRON AGE of Feb. 2.

Bars.—Demand continues to broaden, embracing a greater diversity of manufacturing consumers. This buying is still largely for replenishment purposes, although in some cases 60-day contracts have been closed. It is to be noted that railroad equipment manufacturers are buying more freely and that plants serving the automobile industry are taking an active interest in the market. Even the farm implement makers are in a more cheerful mood and are placing a few orders, although they still have considerable stocks of raw material. Reinforcing projects continue to call for round tonnages. The Concrete Steel Co. will furnish 300 tons for the Popular Mechanics Building, Chicago, and 120 tons for highway work in Bureau County, Ill. The Concrete Engineering Co. has the contract for 300 tons for the Churchill Hotel, Chicago. Pending projects include a viaduct at Ironwood, Mich., for the Chicago & Northwestern and the Soo Line, 300 tons, on which bids are due March 1, the Indianapolis Athletic Club, 180 tons, and two junior high schools, Dubuque, Iowa, 120 tons. No material change is to be noted in going prices on mild steel bars and it is significant that prompt deliveries are not so easily obtainable as heretofore. Demand for bar iron is still subnormal and mill operations are intermittent. The Great Northern divided an order for 150 tons among several mills.

Mill prices are: Mild steel bars, 1.50c. to 1.60c., Chicago; common bar iron, 1.55c. to 1.60c., Chicago; rail carbon, 1.50c., mill or Chicago.

Jobbers quote 2.53c. for steel bars out of warehouse. The warehouse quotation on cold-rolled steel bars and shafting is 3.40c. for rounds and 3.90c. for flats, squares and hexagons. Jobbers quote hard and medium deformed steel bars at 1.90c. base. Hoops and bands, 3.13c.

Sheets.—Domestic demand is picking up and prices appear firm.

Mill quotations are 3c. for No. 28 black, 2.25c. for No. 10 blue annealed and 4c. for No. 28 galvanized, all being Pittsburgh prices, subject to a freight rate to Chicago of 38c. per 100 lb.

Jobbers quote: Chicago delivery out of stock, No. 10 blue annealed, 3.38c.; No. 28 black, 4.15c.; No. 28 galvanized, 5.15c.

Wire Products.—Mills emphatically deny that rumored purchases of nails at $2.25 and plain wire at $2.15 have any foundation in fact. So far as this district is concerned at any rate, the minimum going price on nails appears to be $2.40 while plain wire is firm at $2.25. Demand has appreciably improved and while jobbers still hesitate to pile up stocks, they are placing orders more frequently. Manufacturers also are buying more freely. Inquiries for 1000 tons of rods are in the market. For mill prices see finished iron and steel, f.o.b. Pittsburgh, page 617.

We quote warehouse prices f.o.b. Chicago: No. 9 and heavier black annealed wire, $3.13 per 100 lb.; No. 9 and heavier bright basic wire, $3.28 per 100 lb.; common wire nails $3.25 per 100 lb.; cement coated nails, $2.65 per keg.

Rails and Track Supplies.—The Railroads continue to make heavy purchases of track supplies. The Burlington has bought 10,500 tons of tie plates, of which 3500 tons each went to the Illinois and Inland mills and the remaining 3500 tons were divided between the Interstate and other mills. This road also divided an order for splice bars between two local mills, one of which got 2400 tons and the other a smaller amount. The Union Pacific has placed 1500 tons of tie plates with the Colorado mill, 350 tons of track spikes with Inland, and 200 tons of track bolts with the Kansas City Bolt & Nut Co. Tie plates, spikes and bolts are slightly weaker as reflected in the quotations below. The Gary mill has booked 3000 tons more in rail orders and continues to receive liberal specifications against old contracts. The Inland rail mill will start operations this week.

Standard Bessemer and open-hearth rails, $40; light rails rolled from new steel, 1.50c. to 1.60c., f.o.b. makers' mills. Standard railroad spikes, 2.05c. to 2.10c., Pittsburgh; track bolts with square nuts, 3.05 to 3.10c., Pittsburgh; tie plates, steel and iron, 1.65c. to 1.75c., f.o.b. mill; angle bars, 2.40c., f.o.b. mill.

Plates.—Railroad car construction continues to account for the major part of the demand for plates. Recent orders for cars by the Pacific Fruit Express and the Great Northern, together with an additional purchase of 500 cars by the Burlington, will result in the placing of fully 53,000 tons of steel on mill books. From general sources also, the demand for plates has improved, orders from boiler manufacturers being particularly encouraging. Although tank fabricators are not buying as heavily as some time ago, local mills are figuring on 2500 tons of plates for storage tanks to be built for the Sinclair Oil Co. in the Southwest. No material change is to be noted in the price situation.

The ruling mill quotations range from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plates out of stock.

Bolts and Nuts.—Demand has improved and discounts are no weaker. Jobbers are placing some orders and automobile manufacturers are buying on a broader scale as their operations improve.

Jobbers quote structural rivets, 3.43c.; boiler rivets, 3.53c.; machine bolts up to ⅞ x 4 in., 60, 10 and 10 per cent off; larger sizes, 60 to 10 off; carriage bolts up to ⅞ x 6 in., 60 and 10 off; larger sizes, 55 and 5 off; hot pressed nuts, square and hexagon tapped, $3.75 off; blank nuts, $4 off; coach or lag screws, gimlet points, square heads, 65 and 5 per cent off. Quantity extras are unchanged.

Cast Iron Pipe.—Demand is active and prices are strengthening. The United State Cast Iron Pipe & Foundry Co. is low bidder on 1350 tons for Chicago. Moulton, Iowa, has let 250 tons of the National Cast Iron Pipe Co. and Stratton, Col., has awarded 200 tons to the American Cast Iron Pipe Co.

Toledo, Ohio, 1500 tons, bids in March 15.
Elyria, Ohio, 300 tons, March 1.
Ottumwa, Iowa, 250 tons, March 8.
Fremont, Neb., 330 tons, March 2.
Lucas County Commissioners, Toledo, Ohio, 1500 ft. of 6-in. and larger, April 3.
Detroit, 75 tons of 6-in., March 7.

We quote per net ton, f.o.b. Chicago, as follows: Water pipe, 4-in., $45.60 to $46.60; 6-in. and above, $41.60 to $42.60; class A and gas pipe, $3 extra.

Coke.—Demand for foundry coke is steadily improving, with spot purchases more liberal and contracting ahead less infrequent. Connellsville prices continue to advance, but the local by-product price remains unchanged at $10.75, delivered in Chicago switching district.

Structural Material.—Building prospects are improving, but it is to be noted that much more work is being figured on than is actually let. As spring approaches, it is hoped that the propensity to delay action on pending projects will diminish and frabicators will accumulate enough bookings to put their plants on an efficient operating basis. Prices on plain material are no weaker; in fact, the backlogs which railroad car orders have enabled the mills to build up have given the market some semblance of firmness. Fabricating awards include:

Kansas City Power & Light Co., power plant addition, Kansas City, Mo., 1700 tons, to Kansas City Structural Steel Co.

Diocesan Seminary for Catholic Church, New Orleans, 664 tons, to Ingalls Iron Works, Birmingham.

First National Bank, Albuquerque, N. M., 527 tons, reinforced construction substituted for structural steel.

Henderson Public School, Chicago, 500 tons, to Morava Construction Co.

Murat Shrine Auditorium, Indianapolis, 350 tons, to Rochester Bridge Co.

Milwaukee Electric Railway & Light Co., Milwaukee, addition to Lakeside Steam Generating plant, 160 tons, to Worden-Allen Co.

State highway span, Tomahawk, Wis., 300 tons, to Worden-Allen Co.

Standard Oil Co., 50 horizontal tanks, Whiting, Ind., 268 tons, to unnamed fabricator.

Klamath River Bridge, Hornbrook, Siskiyou County, Cal., 243 tons, to Minneapolis Steel & Machinery Co.

Biltmore Hotel, Los Angeles, 7000 tons.

Detroit Medical Building, Detroit, 1250 tons, bids in March 1.

Snowden Building, a 22-story structure, Memphis, Tenn., to be part reinforced and part structural steel, tonnages not yet estimated.

The mill quotation on plain material ranges from 1.50c. to 1.60c., Chicago. Jobbers quote 2.63c. for plain material out of warehouse.

Old Material.—Consumers are buying more freely and sellers are absorbing railroad offerings at advancing prices. While the change in the market situation is by no means pronounced, prices are generally firmer and sentiment is more optimistic. In addition to the recent orders placed by steel mills, an iron mill has bought 1000 tons of No. 1 wrought at from $11 to $11.25 per net ton delivered. The smaller gray iron foundries are placing orders for cast scrap. Railroad offerings include the Grand Trunk, American Lines, 4000 tons; the Pennsylvania Northwestern Region, 2000 tons; the Monon, 500 tons, and the New York Central, the Big Four, the Erie and the Michigan Central, blank lists.

We quote delivery in consumers' yards, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Iron rails	$16.00 to $16.50
Relaying rails	20.00 to 25.00
Cast iron car wheels	15.00 to 15.50
Rolled or forged steel car wheels	13.25 to 13.75
Steel rails, rerolling	12.00 to 12.50
Steel rails, less than 3 ft	13.00 to 13.50
Heavy melting steel	11.50 to 12.00
Frogs, switches and guards cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50
Low phos., heavy melting steel	13.50 to 14.00
Drop forge flashings	7.50 to 8.00
Hydraulic compressed sheet	8.00 to 8.50
Axle turnings	8.50 to 9.00

Per Net Ton

Iron angles and splice bars	14.25 to 14.75
Steel angle bars	11.00 to 11.50
Iron arch bars and transoms	15.50 to 16.00
Iron car axles	19.50 to 20.00
Steel car axles	13.00 to 13.50
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.00 to 6.50
Cut forge	10.25 to 10.75
Pipes and flues	7.00 to 7.50
No. 1 railroad wrought	10.75 to 11.25
No. 2 railroad wrought	10.25 to 10.75
Steel knuckles and couplers	11.25 to 11.75
Coil springs	12.75 to 13.25
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	13.00 to 13.50
Low phos. punchings	11.00 to 11.50
Locomotive tires, smooth	10.00 to 10.50
Machine shop turnings	5.00 to 5.50
Cast borings	6.50 to 7.00
Stove plate	12.50 to 13.00
Grate bars	10.50 to 11.00
Brake shoes	10.50 to 11.00
Railroad malleable	11.75 to 12.25
Agricultural malleable	11.75 to 12.25

New York

NEW YORK, Feb. 28.

Pig Iron.—A larger tonnage of pig iron was sold last week than for many weeks, the total amounting to about 25,000 tons. The principal buyers were the Warren Foundry & Machine Co., 7500 tons for second quarter; the Central Foundry Co., 7700 tons, delivery March to June; Essex Foundry Co., 2500 tons, delivery March to June; a heater company, 1000 tons, second quarter; special iron, 2000 tons; a wheel company 2500 tons, and other buyers small tonnages amounting to about 2000 tons. Some lower railroad prices are understood to have been made, but the market is firmer now and it is difficult to buy at less than $20, eastern Pennsylvania, or $18.25, Buffalo, for No. 2 plain. Very little attention is being paid to silicon, and one can buy No. 1 iron at almost the same price as No. 2 plain. No very large tonnages are pending this week, one of the principal inquiries being for 1000 tons of malleable. The pig iron market is no doubt affected by the uncertainty in regard to the coal strike, as no one knows to what extent the cost of manufacturing iron will be increased.

We quote delivered in the New York district as follows, having added to furnace prices $2.52 freight from eastern Pennsylvania, $5.46 from Buffalo and $6.16 from Virginia:

East. Pa. No. 1 fdy., sil. 2.75 to 3.25	$23.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	23.02
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	22.52
Buffalo, sil. 1.75 to 2.25	$23.46 to 23.71
No. 2 Virginia, sil. 1.75 to 2.25	28.16

Ferroalloys.—The ferromanganese market is quiet, with business confined to the sale of carload lots for early delivery, both British and domestic, at prevailing quotations. There is an inquiry from an Ohio consumer for 500 tons. The scarcity of spiegeleisen of all grades is the feature and it is probable that this situation will result in the blowing in of at least one producer's furnace in the near future; there is also the incentive of fairly large orders for future delivery for both the 20 per cent and the 16 to 19 per cent grades. The 20 per cent grade has been exhausted and one producer has nothing left except some alloy analyzing about 13 per cent manganese. For the 16 to 19 per cent, the quantity available is still low, but the quotation is unchanged. There have been no developments in the manganese ore market and there seems to be no interest on the part of consumers. There is an inquiry for 300 tons of 50 per cent ferrosilicon before the market, and it is stated that Swedish 50 per cent alloy is being offered at $54.50, delivered, but this is discredited in some quarters, as more than this can be obtained in European markets and also because sales are being made in this market for delivery in Europe. Quotations are as follows:

Ferroalloys

Ferromanganese, domestic, seaboard, per ton	$62.50
Ferromanganese, British, seaboard, per ton	$62.50
Spiegeleisen, 16 to 19 per cent, furnace, per ton	$30.00
Ferrosilicon, 50 per cent, delivered, per ton,	$55.00 to $60.00
Ferrotungsten, per lb. of contained metal	40c. to 50c.
Ferrochromium, 6 to 8 per cent carbon, 60 to 70 per cent Cr., per lb. Cr., delivered	12c. to 14c.
Ferrovanadium, per lb. of contained vanadium	$4.00
Ferrocarbontitanium, 15 to 18 per cent, net ton	$200.00
Ferrocarbontitanium, 15 to 18 per cent, 1 ton to carloads, per ton	$220.00
Ferrocarbontitanium, 15 to 18 per cent, less than 1 ton, per ton f.o.b. Niagara Falls, N. Y.	$250.00

Ores

Manganese ore, foreign, per unit, seaboard	25c. to 26c.
Tungsten ore, per unit, in 60 per cent concentrates	$2.00 up
Chrome ore, 40 to 45 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$20.00 to $25.00
Chrome ore, 45 to 50 per cent Cr_2O_3, crude, per net ton, Atlantic seaboard	$25.00 to $27.00
Molybdenum ore, 85 per cent concentrates, per lb. of MoS_2, New York	50c. to 60c.

Cast-Iron Pipe.—The market continues to show improvement, with fair activity maintained by private purchasers. No new municipal contracts are reported, but one, calling for 2000 tons of various sizes for the Newburgh Water Department, was opened March 1. The City of Ilion, N. Y., is reported to have purchased 1000 tons of cast-iron pipe. Prices are unchanged and, if anything, inclined to stiffen. We quote per net ton, f.o.b. New York, carload lots, as follows: 6-in. and larger, $47.30; 4-in. and 5-in., $52.30; 3-in., $62.30, with $4 additional for Class A and gas pipe.

High-Speed Steel.—This market continues extremely weak and prices, which are difficult to base upon actual transactions, are largely nominal. Resales of various recognized brands have brought low prices, but producers are still quoting 80c. to 85c. per lb. for 18 per cent tungsten high-speed steel, with special brands of some companies bringing up to as high as $1.05 per lb.

Old Material.—Present activity in the market is confined largely to steel mill buying. Prices during the past week have evidenced a slight stiffening, but the situation is not considered in the light of any distinct improvement over previous weeks. The Midvale Steel & Ordnance Co., which recently bought a small tonnage of No. 1 heavy melting steel for the Cambria Steel Co., at Johnstown, Pa., paying $13.50, delivered Johnstown, came into the market again last week, purchasing a much heavier tonnage at $14 per ton, Johnstown, which was probably partly the reason for a slight stiffening in the price of heavy melting steel, now quoted up to $8.50 per ton, New York. A small tonnage of locomotive grate bars to Warren, Pa., was made at $13.50 delivered. In general the market is not active.

Buying prices per gross ton, New York, follow:

Heavy melting steel, yard	$8.00 to $8.50
Steel rails, short lengths, or equivalent	8.25 to 9.00
Rerolling rails	9.25 to 9.75
Relaying rails, nominal	27.00 to 28.00
Steel car axles	10.00 to 10.50
Iron car axles	17.50 to 18.50
No. 1 railroad wrought	9.50 to 10.00
Wrought iron track	8.25 to 9.00
Forge fire	5.25 to 5.75
No. 1 yard wrought, long	9.00 to 9.50
Cast borings (clean)	7.00 to 7.50
Machine-shop turnings	5.25 to 5.75
Mixed borings and turnings	4.50 to 5.00
Iron and steel pipe (1 in. diam., not under 2 ft. long)	7.75 to 8.25
Stove plate	10.00 to 10.50
Locomotive grate bars	9.00 to 9.50
Malleable cast (railroad)	8.00 to 8.50
Cast-iron car wheels	10.50 to 11.00

Prices which dealers in New York and Brooklyn are quoting to local foundries, per gross ton, follow:

No. 1 machinery cast	$16.50 to $17.00
No. 1 heavy cast (columns, building materials, etc.), cupola size	15.50 to 16.00
No. 1 heavy cast, not cupola size	14.50 to 15.00
No. 2 cast (radiators, cast boilers, etc.)	10.00 to 10.50

Finished Iron and Steel.—Keen competition for business has established another decline in prices of plates, shapes and bars. They are now to be had from some mills, when the tonnages are fairly attractive, at 1.35c., Pittsburgh. Even this price has been shaded in the case of large buyers, such as the car companies, which are said to be able now to cover their requirements at a 1.30c. basis. The break is ascribed largely to competition for 8000 tons of structural shapes and universal plates for the addition to the Macy department store, New York. The Levering & Garrigues Co., which was the successful bidder on the steel work, is reported to have placed the entire order with a leading independent at 1.275c., Pittsburgh. The effect of the new price situation has been to divert a fairly large amount of business to this same independent but at the same time fabricators which have recently closed contracts for steel buildings are now hesitant about placing orders for steel except at comparative prices. It is stated that the low price on the Macy work may not be duplicated, as the specification was unusually attractive. Some independent steel companies have notified their district sales offices not to go below 1.40c., Pittsburgh, on plates, shapes and bars, but it is reported to be difficult at the moment to close any business of attractive character at above 1.35c. Weakness in prices seems to affect other finished steel products, with the possible exception of sheets, which, considering the general situation, remain quite firm at 2.25c. for blue annealed, 3c. for black and 4c. for galvanized, all f.o.b. Pittsburgh. Wire nails are quoted at $2.40 per 100 lb. keg, but there has been so much talk of $2.25 that little business is being done at the higher figure. Some mills which reduced wire nails $2 a ton did not change the price on plain wire, which they still quote at $2.25 per 100 lb. Wire nails are active. There is keen competition for orders for cold finished steel bars and shafting, and though the nominal quotation of leading makers is 1.90c., Pittsburgh, this has been shaded as much as $3 a ton. Some of the weakness in steel prices was in evidence in the export market prior

to the change in domestic prices. Plates, shapes and bars have been sold for export at 1.25c., Pittsburgh, while tin plate for export has gone as low as $4 per 100 lb. base box. The nominal domestic price is $4.75, but this is now seldom obtained and $4.60 is being done on carload lots, while a fairly attractive tonnage can be placed at $4.50. February sales, with some companies, have surpassed the tonnages booked in January. Export business shows some pick-up, Japan continuing as the leading buyer. Its wants, which had been largely confined to sheets, tin plate and galvanized wire, have extended within the past week or two to small bars and structural shapes. Inquiries for steel buildings are fairly numerous, giving promise of a fairly active building year. Among the new inquiries are the following:

National Academy, Washington, D. C., 500 tons.

Subway construction for the Southern Pacific at Houston, Tex., 650 tons.

Extension to power station at New Bedford, Mass., 400 tons.

Church of Christ Scientist, Park Avenue, New York, 400 tons.

Public School No. 67, Brooklyn, 500 tons.

Lackawanna Railroad, 2000 tons for bridges, of which 1500 tons is optional.

Office building, Sun Oil Co., Philadelphia, 400 tons.

High school building, Philadelphia, steel and reinforced concrete.

New bids to be opened this week on baseball stadium for New York American League club.

Awards which have been made include the following:

Two lofts and an apartment building in New York to Hinkle Iron Co., 2400 tons total.

Apartment building in Jersey City to American Bridge Co., 1100 tons.

Union High School in Elizabeth, N. J., to Hedden Iron Construction Co., 600 tons.

Mill building at Holyoke, Mass., to American Bridge Co., 400 tons.

Union Memorial Hospital, Baltimore, Md., to Dietrich Brothers, 750 tons.

Fabricated work continues to go at fairly low figures. A recent large job in New York is reported to have been placed at $56, erected. Included in construction work now being figured on are several reinforced concrete jobs requiring a total of several thousand tons of bars. For New York State highway work 1700 tons of bars will be required. General contracts were awarded last week. Oil companies are still active in tank work. The Sinclair Consolidated Oil Corporation, New York, is asking bids on 20 tanks for Kansas, requiring about 6500 tons. Railroads are not active, but an inquiry from the Chicago & Northwestern for 3000 new cars will be issued shortly. Distribution of 1500 cars for the Great Northern has been completed. In addition to 500 refrigerator cars placed with the General American Car Co., as reported last week, the Pullman Co. was awarded 500 stock cars and the Pressed Steel Car Co. 500 general service cars. The New York Central Railroad has obtained prices on 5000 to 10,000 tons of tie plates. The Buffalo, Rochester & Pittsburgh Railroad closed bids last Friday at Rochester, N. Y., on 5000 tons of heavy rails, also angle bars, bolts, nuts and spikes. The Pacific Fruit Express has ordered 700 refrigerator cars from the General American Car Co. and 2600 from the Standard Steel Car Co.

We quote for mill shipments, New York, as follows: Soft steel bars, 1.73c. to 1.78c.; plates, 1.73c. to 1.78c.; structural shapes, 1.73c. to 1.78c.; bar iron, 1.78c. to 1.88c. On export shipments the freight rate is 28.5c. per 100 lb. and the domestic rate 38c.

Warehouse Business.—The situation in this district is generally unchanged, although a few warehouses report a continued improvement in business. Price shading on many items is still prevalent, and there is the usual activity in structural material. Cold-rolled bars have been reduced 10c. per 100 lb., which is in the nature of a revision to bring them down proportionate with other steel items. Brass and copper warehouses report transactions as fairly numerous, but extremely small and unprofitable. Prices here have weakened slightly, being off from ¼c. to ¾c. per lb. on most brass and copper products. Wrought iron and steel pipe is without noteworthy features, but warehouses expect some revision of prices by mills within the next few weeks. Prices in general are evidently weaker. We quote prices on page 636.

Coke.—Foundry coke has now advanced to $4.50 and there is not much available at that figure, as large sales have been made in the past week on account of the fear of a strike of coal miners. Still higher prices are expected on both foundry and furnace grades. The price of by-product coke has not been advanced except that the $8.59 price is now confined to points on the Pennsylvania, Erie and Lackawanna railroads, while the price delivered in New Jersey points on the Central of New Jersey is $9.15. Higher prices on all grades are probable.

Cleveland

CLEVELAND, Feb. 28.

Iron Ore.—Figures prepared by the Lake Superior Iron Ore Association show that on Feb. 1 there was 25,257,000 tons of Lake Superior ore at interior and lake front furnaces. On that date there was at furnaces and on docks 33,480,000 tons as compared with 34,445,000 on the same day last year. Lake Superior ore consumption during January amounted to 2,493,000 tons, falling off slightly as compared with December, when the amount consumed was 2,577,000 tons. In January, 1921, the amount consumed was 3,701,000 tons. With stocks in furnace yards generally large, shipments from docks continue very light.

We quote delivered lower lake ports: Old range Bessemer, 55 per cent iron, $6.45; Old range non-Bessemer, 51½ per cent iron, $5.70; Mesabi Bessemer, 55 per cent iron, $6.20; Mesabi non-Bessemer, 51½ per cent iron, $5.55.

Pig Iron.—The demand showed a further gain during the week and February sales and shipments will aggregate a larger tonnage than during any previous month for some time. There was an increase in the number of small orders the past week and a fair number of large lots up to 800 tons were placed. The firmness that was noted a week ago is still in evidence with $19 as the usual minimum quotation on foundry grades, although the market is apparently not established at this price for shipment to competitive points. Cleveland and Valley furnaces appear to be holding firmly to $19. A fair improvement is noticed in the Michigan territory, this evidently being largely due to the increased activity of the automotive industry. One producer during the week sold 9000 tons including two 500-ton lots of malleable iron, one lot to an Indiana melter and another to an Ohio foundry. An Indianapolis consumer is inquiring for 500 tons of malleable iron. One Cleveland selling agency reports sales during February in excess of 35,000 tons and with four out of eight blast furnaces in operation, is now shipping as much iron as it is making. Other producers report a fair gain in shipments over January. Pickands, Mather & Co. blew in their Perry furnace, Erie, Pa., Feb. 25, this being the second merchant stack operated by Cleveland interests to go in blast during the month and the Otis Steel Co. is planning to blow in one of its Cleveland furnaces about April 1. Detroit, Toledo & Ironton Railroad has made a 20 per cent freight rate reduction on pig iron from Toledo to Detroit, or from $1.54 to $1.23 per ton.

Quotations below are f.o.b. local furnace for Northern foundry iron, not including a 56c. switching charge. Other quotations are delivered Cleveland, being based on a $1.96 freight rate from Valley points, a $3.36 rate from Jackson and a $6.67 rate from Birmingham:

Basic		$19.71
Northern No. 2 fdy., sil. 1.75 to 2.25	$19.00 to	20.00
Southern fdy., sil. 1.75 to 2.25	21.67 to	22.17
Ohio silvery, sil. 8 per cent		30.86
Standard low phos., Valley furnace		32.00

Finished Material.—Orders continue to show an increase both in number and size and the tonnage booked during February represents a fair gain over January. Some of the mills that have been able to make almost immediate deliveries cannot now promise shipments under about two weeks. The improvement applies to about all finished products, although the demand for structural material has not improved as much as other lines. Some of the mills seem inclined to stiffen a little on prices. One Youngstown producer has shut down a plate mill, being unwilling any longer to meet the 1.40c. price and is quoting 1.60c. on the sizes that

are still being made. Ohio tank shops are figuring on a new inquiry for oil tank work requiring 1500 tons of plates. A local mill is adhering to a minimum of 1.40c., Pittsburgh base price on steel bars. The demand for alloy steel has improved as the result of buying by the automotive industries and the United Alloy Steel Corporation, Canton, is now operating 10 open-hearth furnaces or over 50 per cent capacity. Highway work has stimulated the demand for reinforcing bars. Hard steel bars are unchanged at 1.45c. The structural outlook continues to improve. The Austin Co. has taken the sintering plant for the McKinney Steel Co., requiring 950 tons of structural steel and Mt. Vernon Bridge Co. has taken bridge work for the Baltimore & Ohio Railroad requiring 400 tons, which has been placed with a Pittsburgh mill. Bids have been taken for an addition to the Gilsey Hotel, Cleveland, requiring 900 tons, for the Detroit Medical Building, Detroit, 1250 tons and for the Lakewood Market, Cleveland, 200 tons. The Hamilton Furnace Co., Hamilton, Ohio, has an inquiry out for its new blast furnace requiring 1400 tons of plates and structural material. New bids have been taken for the Philadelphia Free Library, requiring 4000 tons. The Lima Locomotive Works has taken five locomotives for the Clover Leaf Railroad and eight for the Burlington Railroad, the remaining 45 for the latter road being taken by the Baldwin Locomotive Works. The Carnegie Steel Co. has taken 1000 tons of rails and splice bars for the Cleveland Railway Co.

Jobbers quote steel bars, 2.36c.; plates and structural shapes, 2.46c.; No. 9 galvanized wire, 3c.; No. 9, annealed wire, 2.50c.; No. 28 black sheets, 3.75c.; No. 28 galvanized sheets, 4.75c.; No. 10 blue annealed sheets, 3.10c.; hoops and bands, 2.96c.; cold-rolled rounds, 3.25c.; flats, squares and hexagons, 3.75c.

Sheets.—There is an improved demand from the automobile industry for full finished sheets. Some fair size orders have been placed with the Cleveland mill by body builders who are buying only for early requirements. New inquiries have come from Japan for 1500 tons of No. 29 and No. 30 gage sheets. Regular sheet prices are being well maintained.

Steel and Cast Iron Pipe.—The Cleveland Water Works Department will receive alternative bids about April 1 for nine miles of 60-in. pipe for extensions. The work will require 22,500 tons of cast iron pipe or 13,000 tons of steel pipe. Bids for 2100 to 3000 tons of small cast iron pipe will be received about May 1. The department requirements will also include 1200 tons of special cast iron fittings. Seattle will take bids March 10 for 17 miles of 66-in. pipe, requiring 15,000 tons of ½-in. plates.

Old Material.—The market became more active during the week and also grew firmer, particularly on steel making grades. Youngstown and Warren mills came in the market for fair-sized tonnages and are reported to have purchased heavy melting steel at $15, compressed steel at $12.50 and mixed flashings at $11.50 to $11.75. Dealers are offering $14.50 to $14.75 for heavy melting steel to fill these new orders and it is reported that as high as $15 has been offered by some dealers. There is some demand for scrap to fill orders for Cleveland delivery and dealers are offering $13 for heavy melting steel and $9.50 for borings and turnings, delivered at consumer's plants in Cleveland.

We quote per gross ton, f.o.b. Cleveland, as follows:

Heavy melting steel	$12.25 to $12.50
Steel rails, under 3 ft.	12.75 to 13.25
Steel rails, rerolling	14.50 to 15.00
Iron rails	12.00 to 12.50
Iron car axles	18.00 to 19.00
Low phosphorus melting	13.50 to 14.00
Cast borings	9.00 to 9.25
Machine shop turnings	8.75 to 9.00
Mixed borings and short turnings	8.75 to 9.00
Compressed steel	9.25 to 9.75
Railroad wrought	12.00 to 12.50
Railroad malleable	12.50 to 13.00
Light bundled sheet stampings	7.00 to 8.00
Steel axle turnings	9.50 to 10.00
No. 1 cast	15.00 to 16.00
No. 1 busheling	9.00 to 9.25
Drop forge flashings, over 10 in.	9.00 to 9.25
Drop forge flashings, under 10 in.	9.25 to 9.75
Railroad grate bars	12.75 to 13.00
Stove plate	13.00 to 13.25
Pipes and flues	8.50 to 9.00

Bolts, Nuts and Rivets.—The improvement in nut and bolt orders as previously noted, is holding up. Some export business has come out, including a two-car lot taken by a local maker for shipment to England. Prices on semi-finished hexagon nuts have been established at lower prices than have appeared in recent regular quotations. The demand for rivets continues quiet, the $5 a ton price reduction noted last week not having stimulated buying.

Coke.—Considerable activity has developed in Wise County foundry coke, the possibility of a coal strike evidently having stimulated the demand. Several sales at $5.50 are reported, including 1500 tons to a sanitary interest. Connellsville foundry coke is firm at $4 to $4.50.

Cincinnati

CINCINNATI, Feb. 28.

Pig Iron.—The market was again quiet during the past week, though a few sales of over 100 tons were reported. A Cleveland district melter took 250 tons of silvery at the schedule, and a Dayton melter closed for a similar amount of Southern iron at a price reported to be on the basis of $15.10, Birmingham. Several sales of 100-ton lots of both Northern and Southern were made to melters in this district, prices in practically all cases being on the basis of $18.50, furnace, for Northern and $15.50 for Southern. A sale made during the previous week is also reported, this being 4000 tons of Southern iron to a radiator company's Western plant. This iron was sold at a delivered price and both river and rail will be used in making shipment. The radiator company making the purchase is reported to have closed on 27,000 tons for its various plants, this being in addition to 15,000 tons placed in January. The market is, if anything, firmer, one lake interest which has been making low prices having advanced its price from 50c. to 75c. a ton. The lowest quotation reported in this market during the week was $18.50, this being done in strongly competitive territory. Several inquiries are before the trade. The Link-Belt Co. is inquiring for 500 tons of malleable for Indianapolis plants, and the Indiana Reformatory is asking for 400 tons of various grades. The National Cash Register Co. is inquiring for four cars and the Home Stove Co., Indianapolis, for five cars. There is a fair market for alloys and several carload sales are reported. A local agency also reports a sale of 1500 tons of fluorspar. Belfont furnace at Ironton is scheduled to blow in shortly on Bessemer iron.

Based on freight rates of $4.50 from Birmingham and $2.52 from Ironton, we quote f.o.b. Cincinnati:

Southern coke, sil. 1.75 to 2.25 (base)	$19.50 to $20.00
Southern coke, sil. 2.25 to 2.75 (No. 2 soft)	20.00 to 20.50
Ohio silvery, 8 per cent sil.	30.02
Southern Ohio coke, sil. 1.75 to 2.25 (No. 2)	21.52 to 22.02
Basic, Northern	21.02
Malleable	22.02 to 22.52

Finished Material.—During the past week more orders were received for finished materials than has been the case for many weeks past. While it is true that the larger number of the orders are for single car loads, the fact that they came from many different sources is a source of gratification, as it indicates that more manufacturing plants are in the market for their needs. An inquiry for 1000 tons of bars is current, as are several tentative ones for structural material for buildings, which are expected to be awarded during the next week or so. Some fair sized orders are booked, including one for 300 tons of plates and another for 300 tons of shapes. More orders are also reported for sheets, and while these are all being booked for immediate delivery, the total tonnage is very satisfactory. Orders for wire products, while fairly numerous, show a falling off as compared with previous weeks, this, no doubt, being accounted for by expectations on the parts of buyers that lower prices will shortly develop. Bids will close on Feb. 27 for approximately 100,000 tie plates for the Big Four Railroad, and it is likely an award will be made later in the week. In the structural field, no new projects appeared during the week. Bids will close on March 1 for the Business Men's Club, Cincinnati, and the Athletic Club at Indianapolis, both taking substantial tonnages. A number of projects involving considerable tonnages for reinforcing bars

will likely be awarded this week, the chief of which is a new high school building at Middletown. Samuel Hannaford & Sons, Cincinnati, will receive estimates until May 14 for the construction of a reinforced concrete building for the Y. M. C. A. in Middletown. The building will be of four stories, 90 x 200 ft. Plant operations will show an increase; the American Rolling Mill Co. at Middletown contemplates putting in operation its Central Works in addition to its East Side Works, which has been running full time for some weeks past. This company will also operate its Ashland steel plant full time, although the sheet mills will not be put on at the present time. At the plant of the Newport Rolling Mill Co., where a strike is in progress, conditions are much improved and the company is operating at about 40 per cent in its sheet mill department.

Warehouse Business.—Jobbers continue to report an improved tone to the market and while orders are being taken only for immediate needs, the number is constantly increasing. Local jobbers of wire products have made reductions of approximately $5 per ton in their prices. Common wire nails are now quoted at $2.75 per keg base and No. 9 annealed wire at $2.60 per 100 lb. The old prices were $2.95 and $2.85 respectively.

Iron and steel bars, 2.75c. base; hoops and bands, 3.35c. base; shapes and plates, 2.85c. base; reinforcing bars, 2.82½c. base; cold rolled rounds, 1½ in. and larger, 3.50c. base; under 1½ in. and flats, squares and hexagons, 4c.; No. 10 blue annealed sheets, 3.60c.; No. 28 black sheets, 4.25c.; No. 28 galvanized sheets, 5.25c.; wire nails, $2.75 per keg base; No. 9 annealed wire, $2.60 per 100 lb.

Coke.—February was the heaviest month for coke since the depression set in 18 months ago, according to most sellers, and prospects are equally good for March. The threatened coal strike is responsible for a great many consumers stocking up, although many orders are also being booked for second quarter. Prices while firming are quotably unchanged.

Old Material.—Scrap dealers report a much improved tone to the market. The Cincinnati district is still quiet, but many more inquiries are received from Valley points. While there is a tendency to buy against a threatened coal strike, dealers believe that present low prices are also attracting buyers and are looking for some good business. The Big Four Railroad is ordering 4000 tons. Prices, while unchanged, are much firmer and a moderate buying movement would in the opinion of dealers result in an advance.

We quote dealers' buying prices, f.o.b. cars:

Per Gross Ton

Bundled sheets	$3.50 to $4.00
Iron rails	11.50 to 12.00
Relaying rails, 50 lb. and up	24.50 to 25.00
Rerolling steel rails	10.00 to 10.50
Heavy melting steel	8.50 to 9.00
Steel rails for melting	8.50 to 9.00
Car wheels	11.50 to 12.50

Per Net Ton

No. 1 railroad wrought	8.00 to 8.50
Cast borings	3.00 to 3.50
Steel turnings	2.00 to 2.50
Railroad cast	11.50 to 12.00
No. 1 machinery	13.00 to 13.50
Burnt scrap	7.00 to 7.50
Iron axles	15.00 to 15.50
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	3.50 to 4.00

Buffalo

BUFFALO, Feb. 28.

Pig Iron.—The price of $18.50 quoted by several Buffalo furnaces continues to attract inquiry from points outside the district, and the general run of small business is good in consequence. One furnace has sufficient tonnage booked to take all the product of one stack now blowing on foundry iron, and this situation will likely keep it out of the market for a time: Internal needs will not permit changing over the blast of the furnace now engaged in basic iron. Furnace operation is now likely to be changed in the near future and there is no disposition to blow in any additional stacks while the price situation remains where it is. Much of the inquiry is from points in New York State outside Buffalo and the East, particularly New England. An inquiry for 5000 tons from a buyer in Westfield, Mass., though not out, is expected soon, as indications have reached sellers that this interest may consider Buffalo iron. Out of a total of 5500 tons inquired for at a Buffalo furnace, the largest single request was for 1000 tons. Sales for last week are well inside 5000 tons and $19 was the exception rather than the rule. Much lower prices are reported in competitive territory, particularly New England, and little attention is being paid to differentials.

We quote f.o.b. per gross ton Buffalo as follows:

No. 1 foundry, 2.75 to 3.25 sil	$19.00 to $19.50
No. 2X foundry, 2.25 to 2.75 sil	18.50 to 19.00
No. 2 plain, 1.75 to 2.25 sil	18.00 to 19.00
Basic	18.00 to 18.25
Malleable	19.00 to 19.50
Lake Superior charcoal	27.75

Coke.—Lively demand has developed a stronger market and best grades are now quoted at $4.50 to $5 f.o.b. ovens. A number of small buyers are buying ahead, having in mind the strike possibility.

Finished Iron and Steel.—Wire business represents the bulk of trade in finished materials. Bars, plates and shapes are quiet, and in the first named material it is obvious that $1.40 price is more freely quoted. All materials on which prices are asked carry the additional condition that prompt shipment is a factor in the purchase. One mill has gathered sufficient bar orders to justify the putting in of an additional open-hearth furnace, bringing its total battery up to four. Electric welded fabric, spring wire, wire rope, are up to normal. Inquiry for small quantities of structural shapes for use in the spring is beginning to appear, and on larger operations architects promise some good-sized jobs will be out within the month of March. The Dellwood Elevator Co., which has a branch here, will erect an addition to its present facilities in Buffalo and the general contract has been given to the Fegels Construction Co., Minneapolis, Minn. The structural requirements have not been made known, but the job will require a large tonnage of reinforcing bars.

We quote warehouse prices f.o.b. Buffalo as follows: Structural shapes, 2.65c.; plates, 2.65c.; plates, No. 8 gage, 3.35c.; soft steel bars and shapes, 2.55c.; hoops and bands, 3.15c.; blue annealed sheets, No. 10, 3.40c.; galvanized steel sheets, No. 28, 5.25c.; black sheets, No. 28, 4.25c.; cold-rolled strip steel, 5.90c.; cold-rolled round shafting, 3.40c.

Old Material.—While the demand for all grades is good, expected advances in prices have not developed. Sales of heavy melting steel at $13.50 have been made but are confined to 500 and 1000 ton lots. Production is far short of demand at the price.

We quote dealers' asking prices per gross ton f.o.b. Buffalo as follows:

Heavy melting steel	$13.00 to $14.00
Low phos., 0.04 and under	17.00 to 18.00
No. 1 railroad wrought	15.00 to 16.00
Car wheels	16.50 to 17.50
Machine shop turnings	7.50 to 8.00
Cast iron borings	7.00 to 8.00
Heavy axle turnings	10.50 to 11.50
Grate bars	12.00 to 13.00
No. 1 busheling	10.00 to 11.00
Stove plate	15.00 to 16.00
Bundled sheet stampings	8.00 to 9.00
No. 1 machinery cast	17.00 to 18.00
Hydraulic compressed	10.50 to 11.50
Railroad malleable	13.00 to 14.00

Birmingham

BIRMINGHAM, ALA., Feb. 28.

Pig Iron.—At close of February, Birmingham pig iron was stronger than it had been since the price and production slump began more than a year ago. The base was $15.50, lower than at one time during the month, but demand was decidedly better, in greater volume, from a wider territory and from greater variety of melters than in many weary months. Practically all business was done on a $15.50 base except under peculiar circumstances with an occasional car lot going at $16. The strength of the market consists principally of the sold-up condition of more than one interest through March and inability to book more business for prompt delivery. One active interest withdrew from the market for March delivery last week because it was overbooked and had exhausted yard stocks with exception of a small quantity already cared for. Toward the end of the week it turned down a steady influx of orders, as many as a dozen in a day, on account of their being for prompt delivery and the company's inability to make that delivery on additional tonnage. Another maker was booked to capacity for March just about at week's close. The week-end witnessed what might almost be termed a clamor for small

lots for prompt delivery over the South. One day's bookings by one maker included deliveries for Virginia, Louisiana, Texas, East St. Louis, Indiana and Ohio and involved 900 tons in lots of various sizes. Buying seems to be very general by all kinds of interests. Pipe interests are buying again and are figuring on large tonnages. Iron makers are inclined to look for a stiffening of prices following the healthy state of the demand. Lots of 300 to 500 tons have been sold in St. Louis and Chicago territory at $15.50. Birmingham iron is once more on a footing in competitive territory.

We quote per gross ton f.o.b. Birmingham district furnaces as follows:

Foundry, silicon 1.75 to 2.25	$15.50
Basic	14.50
Charcoal, warm blast	32.00

Finishing Mills—The Tennessee company went to capacity production in its open-hearth department this week. This follows one of 77 per cent for three consecutive weeks and one of 50 to 60 per cent for some time prior to that. The fifth blast furnace at Ensley resumed making basic iron for the ingot mills. The rail mill, which for months produced 6000 tons a week and latterly 8000 tons, went this week on a 10,000-ton schedule. Plate, guide and bar mills are on double turn. Atlantic Coast Line has placed 10,000 tons of rails with the Tennessee company and it is believed Ensley will roll the 10,000 tons booked by the United States Steel Products Co. for the Imperial Japanese Government. A vessel is now headed to Mobile to take rails for Japan. American Steel & Wire and Gulf States Steel companies are credited with 60 per cent of production. Steel sheets are strong in demand in the Southeast owing to structural activity.

Cast Iron Pipe.—The American Cast Iron Pipe Co. and National Cast Iron Pipe Co. are on practically full turn and three plants of the United States Cast Iron Pipe Co. are gradually increasing production. All three interests made sizeable bookings in the past two weeks, especially in the Middle West. Base is $33. Sanitary pipe was still hanging fire last week, but makers are not worried. Demand seems assured. Cutting below the $37 base is understood to have about ceased. Shops are averaging four days a week.

Coal and Coke.—Foundry coke makers were borrowing from one another last week to fill the acute spot demand. Toward the end of the week, all were taxed to supply the prompt shipment orders from all around, including Illinois, Kansas and Pacific Coast. The base remains at $5.

Old Material.—Scrap dealers feel more hopeful than in a long time following the general toning up of the iron and steel markets and are holding rather firmly to the present scale.

We quote per gross ton f.o.b. Birmingham district yards as follows:

Steel rails	$11.00 to $12.00
No. 1 steel	10.00 to 11.00
No. 1 cast	14.00 to 15.00
Car wheels	13.00 to 14.00
Tramcar wheels	12.00 to 13.00
No. 1 wrought	12.00 to 13.00
Stove plate	11.00 to 12.00
Cast iron borings	6.00 to 7.00
Machine shop turnings	6.00 to 7.00

Boiler Sales in 1921

At the annual meeting in Pittsburgh, Feb. 13, of the American Boiler Manufacturers' Association, it was announced that 1921 sales of boilers, amounting to 547,505 h.p., represented between 25 and 30 per cent of normal. Sales, by quarters, and expressed in h.p., were as follows:

	Horizontal			Vertical	
1921	Water Tube	Return Tubular	Locomotive	Fire Tube	Total
First quarter...	57,987	38,054	10,058	12,258	118,357
Second quarter.	80,982	40,021	4,764	7,811	133,578
Third quarter...	77,771	53,717	7,018	7,953	146,459
Fourth quarter.	93,499	40,432	4,900	10,280	149,111
Year	310,239	172,224	26,740	38,302	547,505

Total January sales will slightly exceed 57,000 h.p. This is the highest total since November, 1920, and is at a rate 25 per cent greater than 1921 sales, and 15 per cent greater than sales during the fourth quarter of that year.

San Francisco

SAN FRANCISCO, Feb. 23.

Pig Iron.—Though there has been but little improvement in actual business during the past two weeks opinion seems to be that the movement of the trade is upward. Foundries have been inquiring more of late and there has been a little better demand for castings. Interest is now divided between domestic and foreign material, the price basis of the former being a near approximation to that of imported iron. There has been a good deal of offerings for Gulf shipment in this market, but the business consummated has not been large. Perhaps the best deal was that involving 500 of basic domestic pig iron, which sold at a figure something under $30, delivered San Francisco. Most of the business has been in small lots, and one large handler reports having disposed of about three cars all told at around $33, ex ship, San Francisco, for foreign.

Coke.—The auxiliary Kobenhavn a few days ago delivered about 5000 tons of mixed coke and pig iron from Newcastle-on-Tyne. The large part of this cargo has already been sold to several of the local consumers, for the most part in small quantities. Business in coke continues steady, although the volume yet is not of great importance.

Finished Iron and Steel.—During the past fortnight there has been a better outlook in manufactured products, although even at present it cannot be said that the market is active; in fact, most makers report a slow condition. Prospects for constructions of various kinds have not been wanting, but so far many do not pass the primary stage, with the result that actual offerings of consequence are not numerous. There is, however, a better feeling, and jobs of smaller dimensions, involving from about 150 to 250 tons, are picking up. This seems to indicate that building construction work is showing some betterment. The most conspicuous prospect in this connection is that of the proposed Biltmore Hotel in Los Angeles, costing in the neighborhood of $5,000,000. It is estimated that about 3600 tons of steel will be required on this job. Bids open March 8. A notable contract just closing is that for a State building at Sacramento, involving approximately 2750 tons of steel materials. The American Bridge Co. had the lowest bid. There is a prospect of 1000 tons of plates pending, but it has not assumed a very definite shape. The market for plates, shapes and sheets is moderately steady, although in the case of plates, undercutting prevails. One large interest reports having sold around 500 tons of sheets last month, and doing a fair business at present. One of the most active outlets for steel at present is the street railroads. Throughout the State and in those adjoining California, there is good activity in this line, and many are buying special work in better volume than for months past. A contract just awarded involves 2000 tons of 7-in. girder rails for a Southern street line. A traction company of Oakland is in the market for 250 tons of girder rails. A Portland street railway is inquiring for 525 tons of girder rails and for 700 tons of standard section T rails.

Cast Iron Pipe.—Relative quietness prevails in this market, although private business appears to be of good volume, large interests having several hundred tons each on their books. Prices remain about steady at around $32, base. Practically the only municipal offerings are for 300 tons of 4-in. pipe, Glendale having readvertised; and for 50 tons of 6-in. pipe for Sacramento.

Old Material.—Melting grades continue to move in fair volume at about the standing basis of $10 a gross ton, delivered at consumers' works. Cast iron scrap is an uninteresting line at from about $20 to $22. Owing to the heavy selling of melting steel during the past month, the market at present is congested and lower prices are anticipated. A 2000-ton sale was made recently, and one or two others averaged from about 1000 to 1500 tons. Desire of holders to liquidate seems to be the chief reason for this trading.

St. Louis

ST. LOUIS, Feb. 28.

Pig Iron.—Several large sales of Northern pig iron were made during the last week, including 2000 tons of foundry iron for nearby shipment, 1000 tons of foundry iron for shipment over the next 90 days and 200 tons of malleable for immediate shipment. Sales of carloads and up to 100 tons continue to make up the greater part of the business, and these are for immediate shipment. These smaller orders seem to be on the increase. The Northern market is firm at $20, Chicago, which price is being followed by the Granite City producer. The market for Southern iron is still at $15.50, Birmingham. Most of the orders for Southern iron here are going to a producer who is moving it by water and rail from Sheffield. Previous to this week no business was accepted for this movement for less than a barge load, 300 tons, but now orders are being taken for as small amount as 50 tons, with the result that 1200 tons were sold in this market by this producer in the last week. This pig iron is being sold on the basis of $16, Sheffield, to which is added the all-rail freight to St. Louis from that point, $4.94, which is 80c. less than from Birmingham, making $20.94, f.o.b. St. Louis, all rail, with an allowance of $1.50 for barge shipment, thus reducing the price to $19.44, f.o.b. St. Louis by barge and rail delivered to customer on railroad cars at his switch. Most of the purchasers were stove foundries, whose business is improving. Inquiries for Northern iron include 2000 tons reported last week and still pending for an Illinois melter, 2000 tons from a Southwestern melter, and several for from 300 to 500 tons for delivery over the next 90 days. The Eighth Federal Reserve bank reports that jobbing foundries are operating at about 22 per cent of capacity, and the larger steel plants at from 18 to 40 per cent. Manufacturers of heating apparatus have been operating at full time, and implement makers report a seasonal increase. There is an inquiry for a car of ferromanganese.

We quote delivered consumers' yards, St. Louis, as follows, having added to furnace prices $2.80 freight from Chicago and $5.74 from Birmingham:

Northern foundry, sil. 1.75 to 2.25	$22.80
Northern malleable, sil. 1.75 to 2.25	22.80
Basic	22.80
Southern foundry, all rail, sil. 1.75 to 2.25	21.24
Southern foundry, sil. 1.75 to 2.25, rail and water	19.44

Finished Iron and Steel.—The market for finished iron and steel is quiet. There is hardly anything being done in structural steel because of the wage situation. All bids for the Jewish Hospital at Memphis, involving 300 tons of reinforcing bars, have been rejected and new bids will be asked for after a year. Owen, Payson & Carswell, Kansas City, are the architects for a new school to be erected at Fort Madison, Iowa, to cost $265,000. Railroads are putting out no inquiries of consequence.

For stock out of warehouse we quote: Soft steel bars, 2.62½c. per lb.; iron bars, 2.62½c.; structural shapes, 2.72½c.; tank plates, 2.72½c.; No. 10 blue annealed sheets, 3.47½c.; No. 28 black sheets, cold rolled, one pass, 4.15c.; cold drawn rounds, shafting and screw stock, 3.65c.; structural rivets, $3.52½ per 100 lb.; boiler rivets, $3.62½; tank rivets 7/16-in. and smaller, 65 and 5 per cent off list; machine bolts, large, 60-10 per cent; small, 60, 10 and 10 per cent; carriage bolts, large, 55-5 per cent; small, 60 and 10 per cent; lag screws, 65-15 per cent; hot pressed nuts, square or hexagon blank, $4; and tapped, $3.75 off list.

Coke.—The demand for coke is increasing, although still largely confined to carload orders for immediate shipment. Consumers are content to buy only for immediate needs, and the fear of a coal strike has not as yet developed any desire to stock up. There has been an advance of 25c. to 50c. a ton, and the best brands of Connellsville are selling at from $4.50 to $5 a ton.

Old Material.—A decidedly better feeling has prevailed in the old material market during the last few days, owing to the large orders for cars and equipment reported placed by the railroads, but this sentiment has not yet reached the consumers, as they are still out of the market. Owing to the recent advance of $2 a ton in Northern pig iron prices, cast iron scrap has suddenly become very scarce and the price on this commodity has stiffened considerably. Scrap couplers and knuckles and railroad springs are also in demand and these items are much stronger. The only railroad offerings reported is a list from the Louisville & Nashville Railway aggregating about 10,000 tons, and an open list issued by the Big Four, which closes to-day, also an open list issued by the New York Central, which closes on March 2.

We quote dealers' prices f.o.b. consumers' works, St. Louis industrial district and dealers' yards, as follows:

	Per Gross Ton	
Old iron rails	$14.00 to	$14.50
Steel rails, rerolling	10.50 to	11.00
Steel rails, less than 3 ft	12.50 to	13.00
Relaying rails, standard section	23.00 to	28.00
Cast iron car wheels	13.50 to	14.00
No. 1 heavy railroad melting steel	10.00 to	10.50
No. 1 heavy shoveling steel	9.75 to	10.00
Ordinary shoveling steel	9.50 to	10.00
Frogs, switches and guards, cut apart	10.00 to	10.50
Ordinary bundle sheet	4.00 to	4.50
Cast steel bolsters	9.50 to	10.00
Per Net Ton		
Heavy axles and tire turnings	6.00 to	6.50
Iron angle bars	13.00 to	13.50
Steel angle bars	9.00 to	9.50
Iron car axles	18.00 to	18.50
Steel car axles	12.50 to	13.00
Wrought iron arch bars and transoms	15.00 to	15.50
No. 1 railroad wrought	9.50 to	10.00
No. 2 railroad wrought	8.50 to	9.00
Railroad springs	11.00 to	11.50
Steel couplers and knuckles	11.00 to	11.50
Locomotive tires, 42 in. and over, smooth inside	8.00 to	8.50
No. 1 dealer's forge	8.00 to	8.50
Cast iron borings	5.50 to	6.00
No. 1 busheling	8.50 to	9.00
No. 1 boilers cut in sheets and rings	6.00 to	6.50
No. 1 railroad cast	13.50 to	14.00
Stove plate and light cast	11.50 to	12.00
Railroad malleable	8.50 to	9.00
Agricultural malleable	9.00 to	9.50
Pipes and flues	7.50 to	8.00
Heavy railroad sheet and tank	5.50 to	6.00
Light railroad sheet	3.50 to	4.00
Railroad grate bars	9.50 to	10.00
Machine shop turnings	3.00 to	3.50
Country mixed iron	6.00 to	6.50
Uncut railroad mixed	7.00 to	7.50
Horseshoes	9.50 to	10.00
Railroad brake shoes	9.50 to	10.00

Buys Steel Rails

ST. LOUIS, Feb. 28.—Missouri Pacific Railway bought 200,000 tons of 85 and 90-lb. steel rails, the bulk of the business going to the Colorado Fuel & Iron Co. and the remainder to the Illinois Steel Co. and Inland Steel Co. The same road has an inquiry out for 14,000 angle bars for 90-lb. rails and 39,000 angle bars for 85-lb. rails.

Boston

BOSTON, Feb. 28.

Pig Iron.—More activity is noted in this territory. The Draper Co., Hopedale, Mass., wants 1000 tons silicon 3.25 to 3.75, 100 tons prompt delivery and the balance as soon as possible, and a car of charcoal iron. The General Fire Extinguisher Co., Providence, R. I., wants 100 tons silicon 2.25 to 2.75, and 200 tons, silicon 2.75 to 3.25, March delivery, and equal amounts, April and May deliveries. The Milford Iron Foundry, Milford, Mass., is inquiring on 200 tons, silicon 2.75 to 3.25; the E. D. Jones & Sons Co., Pittsfield, Mass., for 150 tons No. 2 plain; the Portland Stove Co., Portland, Me., for 50 to 150 tons No. 2X; the Old Colony Foundry Co., Bridgewater, Mass., the Clinton Foundry Co., Clinton, Mass., and other melters for small tonnages, the aggregate active business amounting to 3000 to 4000 tons. The H. B. Smith Co., Westfield, Mass., indicates it shortly will be in the market for 5000 to 7500 tons, and the Gurney Heater Co., Framingham, Mass., 2000-ton inquiry again shows life. Few sales of round tonnages were made this week. They include 400 tons of special analysis eastern Pennsylvania to a Connecticut melter, 300 tons No. 2X Buffalo to a Maine foundry, and three 50-ton lots, one malleable, to the Sullivan Machinery Co., Clairmont, N. H. Eastern Pennsylvania furnaces continue to quote $20, furnace base, or higher, but are not important factors in this territory due to lower prices quoted by other iron makers. It is still possible to buy No. 2 plain and No. 2X eastern Pennsylvania iron at $19 furnace. One furnace this

week quoted $18.75 furnace, or $22.81 delivered, on silicon 2.75 to 3.25. Buffalo No. 2 plain, No. 2X and No. 1X generally is quoted at $18 to $18.50 furnace. One interest this week quoted $17.75 Buffalo or $23.21 delivered on No. 1X. The Virginia market consists of small lots of high manganese iron on a $22.50 furnace base, and the Alabama of a car here and there at $15.50, furnace base. Lake charcoal iron, heretofore quoted here at $28 furnace base, is now obtainable at $23.

We quote delivered at common New England points as follows, having added to furnace prices $4.06 freight from eastern Pennsylvania, $5.46 from Buffalo, $6.58 from Virginia and $10.66 from Alabama:

East. Penn., sil. 2.25 to 2.75	$22.81 to $24.56
East. Penn., sil. 1.75 to 2.25	22.81 to 24.06
Buffalo, sil. 2.25 to 2.75	23.21 to 24.46
Buffalo, sil. 1.75 to 2.25	23.21 to 23.96
Virginia, sil. 2.25 to 2.75	29.58
Virginia, sil. 1.75 to 2.25	29.08
Alabama, sil. 2.25 to 2.75	26.66
Alabama, sil. 1.75 to 2.25	26.16

Finished Material.—McClintic-Marshall Co. is awarded 350 tons of structural steel for a coal pocket, Cranston, R. I.; and the New England Structural Co. 100 tons for a Boston theatre addition, and 100 tons for an addition to the Fall River Gas Works Co., Fall River, Mass., plant. Stone & Webster, Boston, this week will award 430 tons for a New Bedford, Mass., lighting plant project. Bids are in on 300 tons for an Edison Co. of Boston, South Boston plant addition. The Boston Elevated Railway, Forest Hills inspection department, 60 x 500 ft, will require a round tonnage of steel, bids for which are being asked. The Lackawanna Steel Co. has closed with the Maine Central Railroad for 5000 tons of 85-lb. rails, and the Bethlehem Steel Co. for a round tonnage of frogs and switches. Mill representatives report a better demand for bars, etc., with 1.40c. Pittsburgh the usual asking price.

Jobbers now quote: Soft steel bars, $2.55½ per 100 lb. base; flats, $3.05½; concrete bars, stock lengths, $2.55½; structural angles and beams, $2.65½; plates, $2.65½ to $2.83; tire steel, $3.85 to $4.25; open hearth spring steel, $4.50; crucible spring steel, $11.50; bands, $3.15½ to $3.53; hoop steel, $3.15½; cold rolled steel, $3.40 to $3.90; toe calk steel, $8; refined iron, $2.55½ per 100 lb. base; best refined iron, $4.25; Wayne iron, $5.50; Norway iron, $5.50; No. 10 blue annealed sheets, $3.48 per 100 lb. base; No. 28 black sheets, $4.50; No. 28 galvanized sheets, $5.50.

Coke.—New England producers of by-product foundry coke announce no change in their price for March. The market is $10.15 delivered where the local freight does not exceed $3.40. Further expansion in releases of contract coke is noted. Such releases this week included 1200 tons by a manufacturer of electrical appliances for two plants, 1000 tons by a maker of textile machinery, and 600 tons by an Ansonia, Conn., foundry. Both the New England Coal & Coke Co. and the Providence Gas Co. are barely keeping even with shipping instructions. Coke is taken in, not so much because of increased foundry melts, as because of apprehension over the coal labor outlook.

Old Material—Were it not for slight activity in turnings and borings, the old material market could be classified as lifeless. Turnings and borings are in light supply due to the low operating ratio of the average machine shop in this territory. It does not take much buying, therefore, to sustain values. Dealers expect higher prices on heavy melting steel within the near future. In the absence of business, quotations on machinery cast, stove plate, railroad malleable, forged scrap, bundled skeleton, axles, shafting, car wheels and rerolling rails sag under their own weight.

The following prices are for gross ton lots delivered consuming points:

No. 1 machinery	$17.50 to $18.00
No. 2 machinery	15.50 to 16.00
Stove plate	14.50 to 15.00
Railroad malleable	13.00 to 13.50

The following prices are offered per gross ton lots f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$8.00 to $8.50
No. 1 railroad wrought	10.50 to 11.00
No. 1 yard wrought	9.50 to 10.00
Wrought pipe (1 in. in diam., over 2 ft. long)	7.00 to 7.25
Machine shop turnings	4.50 to 4.75
Cast iron borings, rolling mill	7.50 to 8.00
Cast iron borings, chemical	8.00 to 9.00
Blast furnace borings and turnings	4.50 to 4.75
Forged scrap and bundled skeleton	4.00 to 4.50
Street car axles	11.50 to 12.00
Shafting	12.00 to 13.00
Car wheels	11.00 to 11.50
Rerolling rails	8.50 to 9.00

Philadelphia

PHILADELPHIA, Feb. 28.

Accompanied by a dip of $1 a ton in prices, the Eastern foundry iron market has had a few days of marked activity, the first real buying flurry since early December. Fully 40,000 tons of iron was sold the latter part of last week by eastern Pennsylvania furnaces to consumers in the Philadelphia and New York districts, very little going to New England. The principal buyers were makers of cast iron pipe and soil pipe. Prices dropped to $19 for No. 2 plain, $19.50 for No. 2X and $20 for No. 1X, f. o. b. furnace, but, after all available tonnage had been closed, were advanced by two or three furnaces to the former basis of $20, furnace, for No. 2 plain.

In steel products, particularly plates, shapes and bars, there have also been price recessions. A leading Pittsburgh independent is generally credited with setting the pace, with the result that sellers admit it is comparaively easy to place attractive orders for plates, shapes and bars at 1.35c., Pittsburgh, while in exceptional instances the dip has gone as low as 1.30c., Pittsburgh. Sheets and wire products appear to be firm, but in nearly all other steel products there is uncertainty as to prices, with the tendency toward concessions. Extra discounts are reported to have been granted on pipe. Bolts are firmer, but rivets and spikes are weak.

Coke and old material show the only upward price tendencies. Furnace coke is strong at $3.40 to $3.50, Connellsville, for prompt shipment, while foundry coke has advanced to a minimum of $4.50, with some ovens quoting as high as $5.50. Stimulated by a buying flurry at Pittsburgh, the Eastern scrap market has turned firmer, but without marked changes in prices.

As a whole, the situation looks somewhat brighter, despite price weaknesses, as in some lines consumers are taking more interest and orders are coming from a greater range of industries.

Pig Iron.—Fully 40,000 tons of foundry iron has been booked by eastern Pennsylvania furnaces in the past week or 10 days, the best buying movement since last December, when many of the first quarter contracts were closed. A good part of the above-mentioned tonnage went at $19, furnace, for No. 2 plain, $19.50 for No. 2X and $20 for No. 1X. The first marked recession occurred a little over a week ago when a New Jersey cast-iron pipe maker bought 7500 tons of No. 2 plain at $20, delivered, or $19.30, furnace. Other cast iron pipe makers and a few soil pipe manufacturers came into the market late last week and keen competition for the business resulted in concessions averaging $1 a ton from what had previously been considered the market. At least two or three of the active sellers withdrew all low quotations after having taken substantial orders and again are quoting on the basis of $20, furnace, for No. 2 plain, but it remains to be seen whether the market is firmly established at that level. In no instance was iron sold for delivery beyond July 1. The buyers are said to have covered for anticipated requirements only, but it is probable that purchasing in this volume was at least partly due to fear of a coal strike April 1. There were several purchases of about 4000 or 5000 tons each, and a fair number of small sales. Two lots of 1000 tons of gray forge iron were sold at about $20.50, delivered. Steel-making iron is not in demand. It is reported here that the Bethlehem Steel Co. will cast about 60 per cent of the 105,000 tons of cast iron segments for the New York-New Jersey vehicular tunnel and the Davies & Thomas Co. the remaining 40 per cent. The Bethlehem Steel Co. will also furnish the steel castings, about 9000 tons. Approximately 75,000 tons of pig iron will be required.

The following quotations are, with the exception of those on low phosphorus iron, for delivery at Philadelphia, and include freight rates varying from 84 cents to $1.54 per gross ton:

East. Pa. No. 2 plain, 1.75 to 2.25 sil.	$19.84 to $21.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.34 to 21.76
Virginia No. 2 plain, 1.75 to 2.25 sil.	26.24 to 26.74
Virginia No. 2X, 2.25 to 2.75 sil.	27.24 to 27.74
Basic delivery eastern Pa.	19.84
Gray forge	20.50 to 21.00
Malleable	22.50 to 24.00
Standard low phos. (f.o.b. furnace)	30.00
Copper bearing low phos. (f.o.b. furnace)	28.00

Plates.—A further break in plate prices has resulted from the efforts of a Pittsburgh independent to obtain a larger share of Eastern business. Orders as small as 200 tons have been taken at 1.35c., Pittsburgh, while it is generally admitted by sellers that buyers would have little difficulty in placing a large tonnage at 1.30c., Pittsburgh. Whether 1.30c. actually has been done has not come to light, but there are strong intimations to that effect. There has been no marked improvement in business, orders continuing at about the rate of the previous two or three weeks. About 1500 tons of plates and 600 tons of shapes required for two boats to be built at the Pusey & Jones shipyard at Wilmington, Del., apparently have not been placed. The Baldwin Locomotive Works will require about 1800 tons of plates for the 47 locomotives it will build for the Chicago, Burlington & Quincy Railroad. We quote sheared and universal plates at 1.35c. to 1.40c., Pittsburgh.

Structural Material.—The P. H. Kelly Construction Co., Philadelphia, was low bidder on the Philadelphia public library. Bids are being taken by the contractor on the steel work, which will require about 4300 tons. Keen competition has developed and low prices are expected. Considerably more building work is being estimated upon by fabricators. Two office buildings for Baltimore are among the new projects. Fabricators having fair-sized tonnages to place are able to cover at 1.35c., Pittsburgh, while there seems little doubt that a very attractive tonnage might be placed as low as 1.30c. Small lots are quoted at 1.40c., Pittsburgh.

Bars.—The demand for steel bars is about keeping pace with that of the past few weeks. Soft steel bars are now available at 1.35c., Pittsburgh, while it is possible that a large tonnage, particularly of reinforcing bars, could be placed at 1.30c., Pittsburgh. Bar iron is unchanged at 1.40c., Pittsburgh, but concessions are reported to have been granted by some mills rolling a limited range of sizes.

Sheets and Tin Plate.—Sheet manufacturers are standing firmly for their prices of 2.25c. on blue annealed, 3c. on black and 4c. on galvanized, Pittsburgh, and in this respect the sheet situation is quite in contrast to other finished steel lines, except possibly wire products, which are also firm. Some of the tin plate manufacturers are making an effort to hold to a minimum of $4.60 per base box, Pittsburgh, but it is possible for large buyers to obtain quotations of $4.50. Stock plate is quoted at $4.25.

Wire Products.—Although the recent reduction on wire products of $2 a ton was generally supposed to apply to all forms of wire, the mills have raised their prices on plain wire to $2.25 per 100 lb., Pittsburgh. Wire nails are quoted at $2.40, galvanized wire at $2.75 and barbed wire at $3.05.

Bolts, Nuts and Rivets.—Bolts are somewhat firmer and discounts of 70, 10 and 5 per cent from list are less frequent, 70 and 10 per cent being quoted in most instances. On the other hand, rivets are weak, structural being quoted frequently at 2.10c. and boiler at 2.20c. per lb., Pittsburgh. The Philadelphia & Reading Railroad is expected to buy 300 kegs of button-head rivets this week.

Coke.—Coke prices have stiffened considerably during the week. For prompt shipment it would probably be difficult to obtain furnace coke below $3.40 Connellsville, while $3.50 is a more common quotation. Foundry coke is at a minimum of $4.50, Connellsville, with some ovens asking as high as $5.50. The coke situation has worried some of the Eastern pig iron producers and at least one stack now in blast may be put out soon if the coke price continues to advance.

Ferroalloys.—An Eastern maker of ferromanganese has taken orders for about 500 tons in the past week, which is somewhat better than has been done in previous weeks. On both British and domestic alloy the price of $62.50, seaboard, remains firm. Spiegeleisen, 16 to 19 per cent, is quoted at $30, furnace. The higher grade is difficult to obtain.

Rails.—Distribution of the Philadelphia & Reading rails for 1922 delivery has been completed as follows: Bethlehem Steel Co., 13,000 tons; Carnegie Steel Co., 5600 tons; Cambria Steel Co., 2000 tons. A fair demand continues for light rails, which are obtainable at 1.40c., Pittsburgh.

Semi-Finished Steel.—A small tonnage of slabs has been sold at $28, Pittsburgh, and this also is the ruling price on re-rolling billets. Forging billets are quoted at $32 Pittsburgh. Wire rods are now quoted at $36, Pittsburgh, an advance of $1 a ton.

Old Material.—Buying of steel scrap at Pittsburgh at prices which reached a maximum of $15.50, delivered, has created a better sentiment in this market, although business has not increased materially in the East. One or two Eastern mills, however, are now permitting shipments on old contracts. The Midvale Steel & Ordnance Co. within the past week has bought 15,000 tons of heavy melting steel, 11,000 tons for Johnstown, 3000 tons or more for Nicetown, and about 1000 tons for Coatesville. Prices paid for Johnstown delivery ranged from $13 to $14 and for Coatesville $11 to $11.50. A few hundred tons of No. 1 railroad wrought was sold at $15.50 and pipe has been sold at $12.50. Chemical borings have been sold at $15. Machine-shop turnings are slightly higher. We quote for delivery at consuming points in this district as follows:

No. 1 heavy melting steel	$12.00 to $12.50
Scrap rail	12.00 to 12.50
Steel rails, rerolling	15.00 to 15.50
No. 1 low phos., heavy 0.04 and under	18.00 to 19.00
Cast iron car wheels	15.00 to 15.50
No. 1 railroad wrought	15.00 to 15.50
No. 1 yard wrought	12.00 to 12.50
No. 1 forge fire	10.00 to 10.50
Bundled sheets (for steel works)	9.50 to 10.00
No. 1 busheling	11.00 to 12.00
No. 2 busheling	9.00 to 10.00
Turnings (short shoveling grade for blast furnace use)	9.50 to 10.00
Mixed borings and turnings (for blast furnace use)	9.50 to 10.00
Machine-shop turnings (for rolling mill and steel works use)	10.00 to 10.50
Heavy axle turnings (or equivalent)	10.00 to 10.50
Cast borings (for steel works and rolling mills)	12.00 to 12.50
Cast borings (for chemical plants)	14.00 to 15.00
No. 1 cast	16.50 to 17.00
Railroad grate bars	14.00 to 14.50
Stove plate (for steel plant use)	14.00 to 14.50
Railroad malleable	12.50 to 13.50
Wrought iron and soft steel pipes and tubes (new specifications)	12.50 to 13.00
Iron car axles	No market
Steel car axles	17.00 to 18.50

CHINA MORE ACTIVE

Chinese Merchants Inquire But Some Business Goes to Europe—Japanese Trade Unchanged

NEW YORK, Feb. 28.—The Japanese trade situation is unchanged. Merchant buying is continuing on a small scale and there is the usual number of Government inquiries. Chinese trade activity, however, is becoming more marked. Small quantities of second-hand structural material, bar crop ends and plate cuttings are in demand from this market. South American markets show an inclination to buy but orders from this source are small. Although prices in European centres still show an upward trend, no immediate possibilities of sales to these markets are reported yet, with the exception of spiegeleisen, for which there have been several small inquiries evidently sent out as price feelers. One exporter and importer in New York believes that he may be able to close on some small quantities of spiegeleisen for European consumption.

A Chinese purchaser, who recently closed on a fairly large tonnage of material, inquiry for which had been current for some time, placed the order in England. Included in this order was about 8000 base boxes of tin plate, reported to have been placed at $10.50 (Hong Kong dollars) per box, c.i.f. Hong Kong, while the galvanized sheets went for about £28 per ton. These were 5 x 7 ft., packed 50 sheets to the box. A c.i.f. Hong Kong price of $4.60 per keg was quoted by the British seller on 2640 picule kegs of iron, checker head, countersunk wire nails. This Chinese buyer is now receiving quotations on another inquiry calling for 1790 picule kegs of wire nails and a tonnage of mild steel bars, ranging in size from ⅜-in. to 2-in., the greater part being ¼-in. Wire ranging up to No. 25 gage to be shipped in 133-lb. bundles, is also included in this inquiry.

British Iron and Steel Market

Cautious Buying Follows Higher Fuel and Iron Prices—Tin Plate Situation Unsatisfactory

(By Cable)

LONDON, ENGLAND, Feb. 28.

Pig iron demand has slackened and consumers are adopting a more cautious attitude, owing to the uncertainty as to future prices resulting from dearer fuel, but makers are still able to dispose of the output of Cleveland foundry iron. Scotland is buying more material from Cleveland. There have been further sales to Hamburg, which are believed to be destined ultimately for Czechoslovakia. Prices are firm on advancing fuel costs. The London Metal Exchange is resuming its dealings in pig iron.

Hematite is firmer and is moderately active, with improved Continental demand. Italy is purchasing with more regularity. The home trade generally is quiet. Few makers are willing to book it below £4 17½s. ($21.55).

Durham coke is strong, producers asking up to 30s. ($6.63) delivered, owing to strong Continental demand.

North Spain and African ore freights are rising; consequently weak sellers of Bilbao Rubio ore are expected to diminish their prices. Meanwhile the ore is held at nominally 26½s. ($5.86) ex-ship Tees.

Lockout notices for March 11 have been posted by the Engineering Employers' Federation, owing to a dispute with the union on overtime payments. There is a reported strike of Welsh chemical workers, but confirmation is lacking.

Steel prices are unchanged, but the tendency is firmer on dearer fuel. Cheap export quotations on steel sections are less heard of, but the works are still badly in need of orders. There is a moderate home trade business in iron bars and hoops.

Sir W. G. Armstrong, Whitworth & Co., Ltd., has closed its Elswick works, at Newcastle-on-Tyne, owing to high costs. The Clyde shipbuilding output for February was six vessels of 20,451 tons.

American wire nails have been offered at 21s. per picul keg ($3.48 per 100-lb. keg) c.i.f. Japan. American No. 8 gage wire is quoted at £16 (3.16c. per lb.) c.i.f. Japan.

Belgian and Luxemburg foundry pig iron stands at £5 to £5 5s. ($22.10 to $23.20) f.o.b. French foundry pig iron is held at £5 10s. to £5 15s. ($24.31 to $25.42) f.o.b.

Belgian light rails are offered at £7 5s. ($32.05) f.o.b., including fish plates. English heavy rails are being sold at £8 ($35.36) f.o.b., for prompt shipment.

French, Belgian and Luxemburg merchant bars are held at £8 to £8 10s. (1.59 to 1.68c. per lb.) f.o.b., for April and May delivery; and plain structural steel at £7 10s. to £7 12½s. (1.48 to 1.51c. per lb.) for March and April shipment. Belgian angles have been quoted at £7 12½s. (1.51c. per lb.) f.o.b., for April and May delivery. Belgian angles are held at £7 12½s. (1.51c. per lb.) f.o.b., for April and May shipment.

German 3/16-in. plates are offered by agents at £7 12½s. (1.51c. per lb.) f.o.b., for May and June shipment. Belgian sheet bars are quoted at £6 10s. ($28.73) f.o.b., for March shipment. French billets are held at £7 ($30.94) f.o.b., and Luxemburg billets at £6 17½s. ($30.39) f.o.b., both for March shipment. Belgian plates are quoted at £10 (1.97c. per lb.) c.i.f. India.

Tin plates are dull and the market is unsatisfactory. Further mills are closing, and consumers are purchasing only from hand to mouth, but the tendency of prices is upward, due to dearer raw materials. Germany is offering 28 x 20 in. plates at 45s. ($9.95) f.o.b. Hamburg, for 8 to 12 weeks delivery. South America has bought tin plate at 19s. ($4.20) f.o.b., prompt delivery. Home consumers paid 18s. ($3.98) f.o.b., prompt.

Galvanized sheets are in fair demand, but the market is quiet and business is slow. Prices are firmer on dearer pig iron. There are few sellers below £15 15s. (3.11c. per lb.) f.o.b. Commencing March 1, galvanized sheet makers will work on the allotment basis. Producers have endeavored to stimulate demand by advancing values, but prices are now weak. Corrugated, 24 gage, is being sold at £15 15s. (3.11c. per lb.) f.o.b.

Continental black sheets, 4 x 2½'s, 2/5, have been sold to India at £11 17½s. (2.34c. per lb.) c.i.f. We quote per gross ton, except where otherwise stated, f.o.b. maker's works, with American equivalent figured at $4.42 per £1 as follows:

Durham coke, delivered	£1	8½s.	to £1	10s.	$6.30 to $6.63
Cleveland No. 1 foundry	4	15			21.00
Cleveland No. 3 foundry	4	10			19.89
Cleveland No. 4 foundry	4	7½			19.34
Cleveland No. 4 forge	4	10			19.89
Cleveland basic	4	10			19.89
Hematite	7	0*			30.94*
East Coast mixed	4	15	to	4 17½	21.00 to 21.55
Ferromanganese	15	0	&	14 10*	66.30 & 64.09*
Rails, 60 lb. and up	8	0	to	9 10	35.36 to 41.99
Billets	7	0	to	7 10	30.94 to 33.15
Sheet and tin plate bars, Welsh	7	0	to	7 7½	30.94 to 32.60
Tin plates, base box	0	18½	to	0 19	4.09 to 4.20
					C. per Lb.
Ship plates	9	0	to	10 10	1.78 to 2.07
Boiler plates	12	10	to	14 0	2.47 to 2.76
Tees	9	10	to	11 0	1.88 to 2.17
Channels	8	15	to	10 5	1.73 to 2.02
Beams	8	5	to	10 0	1.63 to 1.97
Round bars, ¾ to 3 in.	10	10			2.07
Galvanized sheets, 24 g.	15	15	to	16 0	3.11 to 3.16
Black sheets	12	10	to	13 0	2.47 to 2.57
Steel hoops	12	0	&	12 5*	2.37 & 2.42*
Cold rolled steep strip, 20 g.	23	10			4.64

*Export price.

Puddlers' Pay Reduced

YOUNGSTOWN, Feb. 28.—The boiling rate for March-April will be reduced to $8.03 per ton, from $8.22, paid in January-February, as the result of the bi-monthly examination of sales sheets Tuesday by the Western Bar Iron Association and Amalgamated Association of Iron, Steel and Tin Workers.

The average price of bar iron covering the 60-day period ending Feb. 20 was $1.60 per 100 lb., which represents a decline of 5c. per 100 lb. from the average two months before.

Under the new rate, finishers will be paid 28½ per cent above base, as compared with a rate of 30½ per cent above base in the first two months of year. The average bar iron price compares with the current market of $1.40, and the puddling rate will therefore be still further reduced in May-June.

Aggregate shipments by affected interests were less than one third of normal, during the period covered by the settlement.

The puddling rate reached the peak of $18.76 per ton on July-August, 1920, shipment when bar iron averaged $3.55. There has been a steady decline since.

It is estimated 35,000 workers will be directly and indirectly affected by the settlement. James H. Nutt acted for the manufacturers and M. F. Tighe, Pittsburgh, for the employees.

Nagle Steel Co. in Difficulties

The Alan Wood Iron & Steel Co., Rogers, Brown & Co. and the Cortright Coal Co., all of Philadelphia, have petitioned the Federal Court in Philadelphia to adjudge the Nagle Steel Co. a bankrupt. The Nagle Steel Co. owns a small steel plant at Rahway, N. J., and plate and sheet mills at Pottstown and Seyfert Station, Pa.

Prices Finished Iron and Steel, f.o.b. Pittsburgh

Freight Rates

Freight rates from Pittsburgh on finished iron and steel products, in carload lots, to points named, per 100 lb., are as follows:

Philadelphia, domestic	$0.36	Kansas City	$0.815
Philadelphia, export	0.265	Kansas City (pipe)	0.77
Baltimore, domestic	0.35	St. Paul	0.665
Baltimore, export	0.255	Omaha	0.815
New York, domestic	0.38	Omaha (pipe)	0.77
New York, export	0.285	Denver	1.35
Boston, domestic	0.405	Denver (wire products)	1.415
Boston, export	0.285	Pacific Coast	1.665
Buffalo	0.295	Pacific Coast, ship plates	1.335
Cleveland	0.24	Birmingham	0.765
Detroit	0.325	Jacksonville, all rail	0.555
Cincinnati	0.325	Jacksonville, rail and water	0.46
Indianapolis	0.345	New Orleans	0.515
Chicago	0.38		
St. Louis	0.475		

The minimum carload to most of the foregoing points is 36,000 lb. To Denver the minimum loading is 40,000 lb., while to the Pacific Coast on all iron and steel products, except structural material, the minimum is 80,000 lb. On the latter item the rate applies to a minimum of 50,000 lb., and there is an extra charge of 9c. per 100 lb. on carloads of a minimum of 40,000 lb. On shipments of wrought iron and steel pipe to Kansas City, St. Paul, Omaha and Denver the minimum carload is 46,000 lb. On iron and steel items not noted above the rates vary somewhat and are given in detail in the regular railroad tariffs.

Rates from Atlantic Coast ports (i.e., New York, Philadelphia and Baltimore) to Pacific Coast ports of call on most steamship lines, via the Panama Canal, are as follows: Pig iron, 55c.; ship plates, 75c.; ingot and muck bars, structural steel, common wire products, including cut or wire nails, spikes and wire hoops, 75c.; sheets and tin plates, 60c. to 75c.; rods, wire rope, cable and strands, $1; wire fencing, netting and stretcher, 75c.; pipe, not over 8 in. in diameter, 75c.; over 8 in. in diameter, 2½c. per in. or fraction thereof additional. All prices per 100 lb. in carload lots, minimum 40,000 lb.

Structural Material

I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. thick and over, and zees, structural sizes, 1.35c. to 1.40c.

Sheared plates, ¼ in. and heavier, tank quality, 1.35c. to 1.40c.

Wire Products

Wire nails, $2.40 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of $1.25 and shorter than 1 in., $1.75; bright Bessemer and basic wire, $2.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, $2.25; galvanized wire, $2.75; galvanized barbed wire, $3.05; galvanized fence staples, $3.05; painted barbed wire, $2.55; polished fence staples, $2.55; cement-coated nails, per count keg, $1.90; these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days, net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 70½ per cent off list for carload lots; 68½ per cent for 1000-rod lots, and 68½ per cent for small lots, f.o.b. Pittsburgh.

Bolts and Nuts

Machine bolts, small, rolled threads, 70, 10 and 10 per cent off list
Machine bolts, small, cut threads....70 and 10 per cent off list
Machine bolts, larger and longer....70 and 10 per cent off list
Carriage bolts, ⅜ in. x 6 in.:
Smaller and shorter rolled threads.70 and 10 per cent off list
Cut threads ....70 per cent off list
Longer and larger sizes....70 per cent off list
Lag bolts ....70, 10 and 5 per cent off list
Plow bolts, Nos. 1, 2 and 3 heads....60 and 10 per cent off list
Other style heads....20 per cent extra
Machine bolts, c.p.c. and t. nuts, ⅜ in. x 4 in.:
Smaller and shorter....65, 10 and 5 per cent off list
Larger and longer sizes....65 and 10 per cent off list
Hot pressed sq. or hex. blank nuts....$5.50 off list
Hot pressed nuts, tapped....$5.25 off list
C.p.c. and t. sq. or hex. blank nuts....$5.25 off list
C.p.c. and t. sq. or hex. blank nuts, tapped....$5.00 off list
Semi-finished hex. nuts:
⅛ in. to 9/16 in. inclusive..80, 10, 10 and 10 per cent off list
Small sizes S. A. E....80 and 10 per cent off list
⅝ in. to 1 in. inclusive, U. S. S. and S. A. E., 70, 10, 10 and 10 per cent off list
Stove bolts in packages....80 and 3 tens and 5 per cent off list
Stove bolts in bulk....80, 3 tens and 2½ per cent off list
Tire bolts ....70, 10 and 5 per cent off list
Track bolts, carloads....3c. to 3.25c. base
Track bolts, less than carloads....4c. to 4.25c.

Upset and Hex. Head Cap Screws

½ in. and under....80 and 10 to 80, 10 and 10 per cent off list
9/16 in. to ¾ in....80 and 10 to 80, 10 and 10 per cent off list

Upset Set Screws

½ in. and under....80, 10 and 5 to 85 per cent off list
9/16 in. to ¾ in....80, 10 and 5 to 85 per cent off list

Milled Square and Hex. Cap Screws

All sizes ....75 and 10 to 80 per cent off list

Milled Set Screws

All sizes ....70, 10 and 10 per cent off list

Rivets

Large structural and ship rivets....$2.10
Large boiler rivets.... 2.20
Small rivets ....75 and 10 off list

Wire Rods

No. 5 common basic or Bessemer rods to domestic consumers, $36; chain rods, $36; screw stock rods, $41; rivet and bolt rods and other rods of that character, $36; high carbon rods, $43 to $46, depending on carbons.

Railroad Spikes and Track Bolts

Railroad spikes, 9/16-in. and larger, $2 to $2.10 base per 100 lb. in lots of 200 kegs of 200 lb. each or more; spikes, ½-in., ⅝-in. and 7/16-in., $2.15 to $2.25 base; 5/16-in., $2.15 to $2.25 base. Boat and barge spikes, $2.15 to $2.25 base per 100 lb. in carload lots of 200 kegs or more, f.o.b. Pittsburgh. Track bolts, 3c. base per 100 lb. Tie plates, $2 per 100 lb. Angle bars, $2.40 per 100 lb.

Terne Plates

Prices of terne plates are as follows: 8-lb. coating, 200 lb., $9.30 per package; 8-lb. coating, I. C., $9.60; 15-lb. coating, I. C., $11.80; 20-lb. coating, I. C., $13; 25-lb. coating, I. C., $14.25; 30-lb. coating, I. C., $15.25; 35-lb. coating, I. C., $16.25; 40-lb. coating, I. C., $17.25 per package, all f.o.b. Pittsburgh, freight added to point of delivery.

Iron and Steel Bars

Steel bars, 1.35c. to 1.40c. from mill. Refined bar iron, 2c. to 2.10c.

Welded Pipe

The following discounts are to jobbers for carload lots on the Pittsburgh basing card:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛	54½	28	⅛ to ⅜	+ 3½	+22½
¼ to ⅜	60	33½	½	36½	18½
½	65	50½	¾	42½	27½
¾	69	56½	1 to 1½	44½	29½
1 to 3	71	58½			

Lap Weld

2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 6	42½	29½
7 to 8	65	51½	7 to 12	40½	27½
9 to 12	64	50½			

Butt Weld, extra strong, plain ends

¼	50½	33	⅛ to ⅜	+ 4½	+37½
¼ to ⅜	56	38½	½	35½	23½
½	62	50½	¾	42½	28½
¾	67	55½	1 to 1½	44½	30½
1 to 1½	69	57½			
2 to 3	70	58½			

Lap Weld, extra strong, plain ends

2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

To the large jobbing trade the above discounts are increased by one point, with supplementary discounts of 5 and 2½ per cent.

Boiler Tubes

The following are the discounts for carload lots f.o.b. Pittsburgh:

Lap Welded Steel		*Charcoal Iron*	
1¾ in.	26½	1½ in.	5
2 to 2¼ in.	41	1¾ to 1⅞ in.	15
2½ to 3 in.	52	2 to 2¼ in.	25
3¼ to 13 in.	57	2½ to 3 in.	30
		3¼ to 4½ in.	32

To large buyers of steel tubes, a supplementary discount of 5 per cent is allowed.

Standard Commercial Seamless Boiler Tubes

New discounts have been adopted on standard commercial seamless boiler tubes, but manufacturers are not yet ready to announce them for publication, and for that reason we publish no discounts this week.

Sheets

Prices for mill shipments on sheets of standard gage in carloads, f.o.b. Pittsburgh, follow:

Blue Annealed

Cents per Lb.		Cents per Lb.	
No. 8 and heavier	2.20	Nos. 11 and 12	2.30
Nos. 9 and 10 (base)	2.25	Nos. 13 and 14	2.35
		Nos. 15 and 16	2.45

Box Annealed, One Pass Cold Rolled

Cents per Lb.		Cents per Lb.	
Nos. 17 to 21	2.80	No. 28 (base)	3.00
Nos. 22 to 24	2.85	No. 29	3.10
Nos. 25 and 26	2.90	No. 30	3.20
No. 27	2.95		

Galvanized

Cents per Lb.		Cents per Lb.	
Nos. 10 and 11	3.00	Nos. 25 and 26	3.70
Nos. 12 to 14	3.10	No. 27	3.85
Nos. 15 and 16	3.25	No. 28 (base)	4.00
Nos. 17 to 21	3.40	No. 29	4.25
Nos. 22 to 24	3.55	No. 30	4.50

Tin-Mill Black Plate

Cents per Lb.		Cents per Lb.	
Nos. 15 and 16	2.80	No. 28 (base)	3.00
Nos. 17 to 21	2.85	No. 29	3.05
Nos. 22 to 24	2.90	No. 30	3.05
Nos. 25 to 27	2.95	Nos. 30½ and 31	3.10

WASTE IN FOUNDRIES

Concrete Illustrations Given in Meeting of Newark Foundrymen's Association

That waste in industry is not something abstract, something for somebody else to act upon, was brought out strongly by C. E. Knoeppel, C. E. Knoeppel & Co., New York, in addressing the Feb. 25 meeting and dinner of the Newark Foundrymen's Association, at the Downtown Club, Newark, N. J. The subject of Mr. Knoeppel's address was "Some Foundry Overhead Problems under Present Conditions." In pointing out the great necessity for savings in overhead to-day, to offset in some measure lower selling prices and inroads of foreign competition, he stated that the problem of waste was entirely relative in its importance to industry. If all foundries and all manufacturers in the United States were operating at a 20 per cent waste and this 20 per cent of waste were also true of producers the world over, there would be no great necessity for considering waste as a great economic factor. But the relative performances of plants, industries and nations show something different in waste.

Business in this country does not know the facts of industry, past trends and future possibilities. Savings are possible in manufacture, and Mr. Knoeppel related the example of a manufacturer of pumps in the West, who, after performing a surgical operation on his pump, discovered that by thinning one metal part he saved $80,000 a year in production costs. Consideration must be given to economics, budgeting and sales analysis. Mr. Knoeppel's speech was based upon twelve business axioms that he points out are essential to any line of industry. These are:

1. Greatest volume of business goes to that concern whose prices reflect the normal operating conditions.
2. Those who purchase goods should pay most for that which costs most to produce.
3. Productivity (relative amount produced) is, in the last analysis, the gage of real economy in manufacturing.
4. The real investment in a plant, in goods produced, is the hours and minutes spent on them by machines and men (from president to office boy).
5. The best insurance against loss in producing goods is advance knowledge of likely happenings.
6. That concern is best protected against uncertainties in commercial competition which is most closely in touch with all current conditions.
7. The only protection against unintelligent competition in industry is to insure that all factors are considered in setting prices.
8. No division of a business should be served at the expense or to the exclusion of other important divisions.
9. Averages should be ignored, as they mean that some items are less and others more.
10. Profits should be divided so that operating efficiency may be considered separately from sales and buying efficiency.
11. The concern which is best posted as to cost of idleness of men and machines and cost of rejections is in the best position to reduce industrial wastes.
12. Consumers and not producers are those benefited by uneconomic methods of costing and pricing.

All these axioms have a bearing on overhead, price and efficiency of operation, said Mr. Knoeppel, who explained each axiom by quoting actual occurrences in various plants of his experience.

Following the address H. M. Lane, H. M. Lane Co., industrial engineer, Detroit, gave a brief impromptu talk, in which he related several experiences in foundries where he eliminated some of the waste of material, time and other items, assisting in placing production upon a more efficient basis. One of the greatest wastes in foundries, said Mr. Lane, is walking too far in carrying through a process. In one foundry of his experience, after a few time studies he found that twelve men carrying trays of cores were doing the daily equivalent in mileage of one man carrying a tray of cores 14 miles into the country and returning with another tray. By rearranging some of the floor space, he reduced this walking to the equivalent of one man walking four miles into the country and back with the result that in this particular instance the foundry was able to reduce the number of men engaged in this work.

Another instance of reduction of costs by rearrangement was related by Mr. Lane, who told of a core room in which 44 girls were working. By rearranging the benches, tables and racks, which were in the center of the room, production was increased with a force reduced to 23 girls.

The meeting was presided over by J. L. Carter, Barlow Foundry Co., Newark, N. J. The Quigley Furnace Specialties Co., New York, was elected to membership in the association and a resolution opposing the Federal bonus bill, excepting as it includes all possible aid to the wounded and disabled, was passed.

HOG ISLAND SURPLUS

Steel Disposed of by United States Shipping Board in One Lot

WASHINGTON, Feb. 28.—Disposal of 93,754.5 gross tons of surplus steel at Hog Island, Pa., was made to De Neal Samuel, of Washington, as a member of the firm of M. Samuel & Sons, 1746 Woolworth Building, New York, at $9.37 per ton, a total of $887,479.67. M. Samuel & Sons have scrap yards at Brooklyn, Bridgeport, Conn., and Greenville, N. J.

The material was auctioned off last Tuesday through Edward P. Farley, vice-president of the United States Shipping Board Emergency Fleet Corporation. All of the material, according to the terms of the contract, must be removed from Hog Island by Dec. 31, 1922. Because of this the Shipping Board was unable to accept an alternate bid of the Bridgeport Iron & Metal Co., offering $9.50 per gross ton, provided the board would give the company 18 months from the date of signing the contract in which to remove the material. It is the plan of the board to dispose of all of its Hog Island real estate and other property there as early as possible.

On Tuesday, March 7, at 11 A. M., the equipment and fixtures of the Pennsylvania Pressed Steel Corporation, alleged bankrupt, will be offered for sale by order of David L. Ullman, receiver, Philadelphia.

Coke Production Increases

UNIONTOWN, PA., Feb. 27.—Four hundred and fifty ovens were added Saturday to the active list of the H. C. Frick Coke Co., bringing the coke output of the company up to approximately 30 per cent. The week just passed has witnessed a slight further increase in coke production with a stiffening in price, although no increase of a considerable nature has been manifested. A shortage in foundry coke has developed.

Increased furnace activity is taken by observers as the reason for the increased production in coke. Most observers say that the threatened strike in union coal fields is not having an effect on increased coke output. Purchases during the past fortnight have been for immediate consumption. Quotations are $3.25 to $3.60 for furnace coke, with a sale or two reported at $4.

Technologic paper of the Bureau of Standards, No. 206, discusses the "Effect of Heat Treatment on the Mechanical Properties of One Per Cent Carbon Steel." The effects of varying time-temperature relations in heat treatment on tensile impact properties, hardness and structure of 1 per cent carbon steel have been studied, including (a) effect of temperature variations in hardening, (b) time at hardening temperatures both above A_{cm} and between the Ac_1 and A_{cm} transformations, (c) effects of tempering steel hardened in different ways and effects of "soaking" just under the lower critical range, (d) comparison of oil and water hardening for production of definite strengths.

NON-FERROUS METALS

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Straits Tin	Lead		Zinc	
Feb.	Lake	Electrolytic*	New York	New York	St. Louis	New York	St. Louis
.....	13.00	12.75	29.25	4.70	4.40	4.82½	4.47½
.....	12.87½	12.62½	29.87½	4.70	4.40	4.85	4.50
.....	12.87½	12.62½	29.75	4.70	4.40	4.85	4.50
.....	12.75	12.50	....	4.70	4.40	4.85	4.50
.....	12.75	12.50	30.75	4.70	4.40	4.85	4.50
.....	12.75	12.50	29.75	4.70	4.40	4.90	4.55

*Refinery quotation.

New York

NEW YORK, Feb. 28.

Conditions in the copper market are slightly better and demand is improving. The tin market is spasmodically active and prices are rising. The lead market continues active and firm. Inquiry has improved for zinc and prices are stiffening.

Copper.—While actual sales of electrolytic copper cannot be said to have expanded, inquiry is improving and some orders have been placed. There is an undercurrent of optimism and a feeling that the bottom of the market has been reached and that from now on improvement may be expected. This is not alone the opinion of sellers, but also that of some buyers. It is a fact, however, that most large consumers are still well provided for, but a buying movement will not come unexpectedly if it should appear within the next 30 days. Quotations vary with the seller and the quantity involved, and it is possible to buy small amounts of electrolytic at 12.75c., delivered, or 12.50c., refinery, but the majority of sellers who are participating in the market quote 12.87½c., delivered, or 12.62½c., refinery, which may be regarded as the general market, there being still some large producers who remain uninterested under 13c., delivered. Export demand has also improved in the last week and sales have been made at a range of 12.62½c. to 12.75c., f.a.s. New York.

Copper Averages.—The average price of Lake copper for the month of February, based on daily quotation in THE IRON AGE, was 13.19c. The average prices of electrolytic copper was 12.92c., refinery, or 13.17c., delivered.

Tin.—On each day of the last week the market was exceedingly quiet except on Feb. 21 when heavy sales were made of Straits tin, estimated to total at least 1000 tons, with both dealers and consumers participating. The heavy decline in London on the day before, referred to in this report last week, was further emphasized on Tuesday to the extent that prices appeared attractive. Sales in this market were so heavy that some sellers, particularly dealers, found it necessary to do business on the holiday, Feb. 22, to cover sales made the day before, and several hundred tons were dealt in. There has been no activity since then except a sale of two lots of 25 tons of March delivery on the New York Metal Exchange at 28.75c. and 29c. respectively. One cause of the inactivity was the disappointment of the response of the London market to the heavy buying here, referred to. Yesterday and to-day the market was dull, but prices since last week have gradually advanced, due largely to the strength in sterling, until spot Straits to-day was quoted at 29.75c., New York. The London market to-day was about £5 per ton above the low point reached Feb. 21, with spot standard quoted at £145, future standard at £146 15s. and spot Straits at £147 5s. Arrivals thus far this month have been 3270 tons, with 7450 tons reported afloat.

Lead.—The eminently healthy condition of the lead market where consumption fully balances production, continues a characteristic of this market and quotations are unchanged with the leading interest still doing business at 4.70c., New York and St. Louis, and independents at 4.40c., St. Louis, or 4.70c. to 4.75c., New York and Eastern points.

Zinc.—A better feeling pervades the market which has remained inactive and stagnant for many weeks. Inquiry from consumers, particularly galvanizers, is not active and moderate sales have been made at prevailing quotations. The tendency of prices is to stiffen and it is doubtful whether prime Western for early delivery could be bought to-day for less than 4.55c., St. Louis, and there are those who are inclined to quote 4.60c., St. Louis. The rise in the pound sterling has also had its influence, so that there have been tentative proposals by British buyers on a 4.50c., St. Louis, basis, which might have resulted in sales had not the market here stiffened at this time. We quote prime Western for early delivery at 4.55c., St. Louis, or 4.90c., New York.

Antimony.—Quietness pervades the market and wholesale lots for early delivery are quoted at 4.35c., New York, duty paid.

Aluminum.—Wholesale lots of virgin metal, 98 to 99 per cent pure, are still quoted by the leading interest for early delivery at 19c. to 19.10c., f.o.b. plant, depending on the quantity, and the same grade is offered by importers at 17c. to 18c., New York, duty paid.

Old Metals.—Prices are a little lower and buying is only of the hand to mouth variety. Dealers' selling prices are as follows:

	Cents Per Lb.
Copper, heavy and crucible	12.50
Copper, heavy and wire	11.50
Copper, light and bottoms	9.00
Heavy machine composition	9.50
Brass, heavy	7.25
Brass, light	5.75
No. 1 red brass or composition turnings	8.00
No. 1 yellow rod brass turnings	6.00
Lead, heavy	4.25
Lead, tea	3.25
Zinc	3.00

Chicago

FEB. 28.—The metals are quiet and prices are the same as last quoted. Tin receded one cent during the latter part of last week and some business came in on the decline, but the price has since recovered to its former level. Old metal prices also are unchanged. We quote in carload lots: Lake copper, 13.25c.; tin, 31c.; lead, 4.50c.; spelter, 4.55c. to 4.60c.; antimony, 6.50c., in less than carload lots. On old metals we quote: Copper wire, crucible shapes and copper clips, 9.50c.; copper bottoms, 7.50c.; red brass, 7.50c.; yellow brass, 6c.; lead pipe, 3.25c.; zinc, 2c.; pewter, No. 1, 22c.; tin foil, 23c.; block tin, 25c.; all buying prices for less than carload lots.

St. Louis

Feb. 28.—Both lead and zinc are notably unchanged; we quote lead at 4.40c., carlots, and slab zinc at 4.50c. On old material we quote: light brass, 3.50c.; heavy red brass, 7c.; light copper, 7c.; heavy yellow brass, 4c.; heavy copper and copper wire, 7.50c.; pewter, 15c.; tin foil, 16c.; tea lead, 2c.; aluminum, 9c.

Nitrogen in Oxyacetylene Weld Metal

Analyses for nitrogen in oxyacetylene weld metal have been completed by the Bureau of Standards on samples which are representative of two types of fracture, crystalline and fibrous. On the basis of combined nitrogen, there seems to be no distinction between the crystalline and fibrous weld metal. The limits of combined nitrogen found were approximately one-sixth the limiting values for nitrogen in electric arc deposited metal, that is, 0.015 to 0.027 per cent nitrogen in oxyacetylene welds, as compared with 0.10 to 0.15 per cent in the arc weld.

A list of 500 or more trade directories is to be published by the Special Libraries Association, 1731 H Street, N. W., Washington. It is said that this is the first time such a list has been compiled and is an answer to demands for trade directories of a specific kind for pursuing sales campaigns and the like.

PERSONAL

Henry Harnischfeger started Jan. 28 on a combined business and pleasure trip around the world. Mr. Harnischfeger is one of the founders and president of Pawling & Hanischfeger Co., Milwaukee, Wis. He expects to go to Japan, the Philippines, China, Burma, Ceylon, India, up through Suez to Naples and Europe. He will visit the various foreign branch offices of the Associated Machinery Corporation, of which Mr. Harnischfeger is also president, with a view to looking over general business conditions and possibilities in the far East and also to determine upon the opening up of new offices. Mr. Harnischfeger will transact business at Kobe, Japan; Hongkong, China; Singapore, Rangoon and Bombay. He is accompanied by Mrs. Harnischfeger.

The resignation of Charles F. Smith, chairman of the board of directors New Britain Machine Co., New Britain, Conn., automatic screw machines, etc., has been accepted. Mr. Smith has been in poor health for some time.

Charles Glover, vice-president American Hardware Corporation, New Britain, Conn., has resigned and has been succeeded by George T. Kimball. Albert N. Abbee, purchasing agent, takes Mr. Kimball's place as secretary. Mr. Glover has been in ill health for some time. He was connected with the corporation or its components for forty years. He was made vice-president in 1917.

Harry Brearley, Brown Bayley's Steel Works, Ltd., Sheffield, England, sailed for home last Saturday after spending some time in this country on business.

Prof. William G. Fearnsides, Sheffield University, Sheffield, England, who has been in the United States and Alaska since last August, returned last week.

J. Harvey Williams, president J. H. Williams & Co., Brooklyn, has been elected president of the American Drop Forging Institute and re-elected president of the Brooklyn Chamber of Commerce.

Clifford Egan has been elected president of the J. A. Fay & Egan Co., Cincinnati, succeeding his father, the late Thomas P. Egan. Si P. Egan and Fred T. Egan were elected vice-presidents; W. M. Green, secretary; A. A. Faber, treasurer, and R. W. Egan, general manager.

At the annual meeting of the stockholders of the Seneca Falls Mfg. Co., Inc., held at Seneca Falls, N. Y., on Feb. 15, Ogden R. Adams was re-elected president and general manager for the coming year. An entirely new board of directors was also elected.

John McConnell, formerly superintendent of the United Steel Co., Canton, Ohio, now the United Alloy Steel Corporation, having been affiliated with that company 11 years, has returned to the Canton corporation as its vice-president in charge of operation. For some time he has been vice-president of the Interstate Iron & Steel Co., Chicago.

Robert D. Carroll, Bucyrus, Ohio, has been elected a director of the Fairbanks Steam Shovel Co., Marion, Ohio.

Ross E. Willis, formerly sales engineer of the Lakewood Engineering Co., Cleveland, in the southern Michigan territory, has become affiliated with Wm. F. V. Newmann & Sons, Detroit, representing the Baker, R. & L. Co. line of industrial tractors, trucks and cranes in the Detroit territory.

Phillip J. McKenna, representative of the Bridgeport, Conn., works of the Crane Co., manufacturer of valves, pipe fittings, plumbing supplies and goods, recently left Bridgeport for a business trip into Mexico.

Peter F. Augenbraun, recently appointed manager of the new plant of the Yale & Towne Mfg. Co., Stamford, Conn., in Germany, left New York for Germany, Feb. 4. He was tendered a farewell dinner at the home plant in Stamford, and was presented a handsome suitcase and a brief case, J. A. Horne, vice-president of the company, being toastmaster. Mr. Augenbraun has been with the Yale & Towne company for 30 years.

The Gilbert & Barker Mfg. Co., Springfield, Mass., recently announced the following additions to the personnel at the plant in Springfield: George W. Atkinson has been chosen superintendent of the maintenance department. Mr. Atkinson was formerly with the U. S. Government, being electrical and consulting engineer at the Springfield, Mass., Armory. Edward W. Beckman, appointed superintendent of the foundry division. Mr. Beckman came from the Kewanee, Ill., plant of the Walworth Mfg. Co., tool manufacturer, where he was foundries superintendent. He was also with the Dodge Mfg. Co., Mishawaka, Ind., for a time. William J. Smith, formerly with the McNab & Harlin Co., has been selected as assistant superintendent of the foundry department.

Joseph H. Roberts, Midvale Steel & Ordnance Co., Nicetown Works, has resigned to become assistant to the president Electric Alloy Steel Co., Youngstown, Ohio.

Edwin S. Webster, president and director Stone & Webster, Boston, and George O. Muhlfeld, vice-president, are in Japan, looking over large engineering works.

James L. Richards, president Massachusetts Gas Co., which owns the New England Coal & Coke Co., Boston, is in Belleair, Fla., recuperating from a serious operation.

Richard W. Maher, sales representative Boston office, Rogers, Brown & Co., pig iron, has been transferred to that company's Buffalo office. Mr. Maher was associated with the Boston office for approximately 10 years, and one of the best known pig iron representatives in the New England territory.

Paul B. Morgan was re-elected president of the Morgan Construction Co., Worcester, Mass., at the annual meeting held last week. The other officers and directors were re-elected also.

Ralph M. Hamilton has resigned as general sales manager of the Jefferson Gas Coal Co. to become sales manager of the coal and coke department of the Iron Trade Products Co., Pittsburgh. In earlier years, Mr. Hamilton was with the Hillman Coal & Coke Co. and the Lackawanna Steel Co.

Oswald Fowler, Rogers Brown & Co., New York, has returned from an extended trip to Norway, Sweden and England. He went abroad to investigate the aluminum business. He found conditions abroad very much depressed with little prospect of early recovery due largely to the demoralized finances of most of the European countries.

Charles M. Schwab, president of the Bethlehem Steel Co., is scheduled to address the annual banquet Friday evening, March 3, of the Chamber of Commerce of Youngstown, Ohio.

Technologic Paper of the Bureau of Standards, No. 203, entitled, "The Influence of Phosphorus Upon the Microstructure and Hardness of Low Carbon Open-Hearth Steels," states that, in this investigation, no clear relationship could be established between the phosphorus content, varying within the range of 0.008 to 0.115 per cent which marks the usual limits in plain carbon steels, and the microstructure and hardness as developed in two series of specimens, one of basic and the other of acid open-hearth steel, by a series of different heat treatments because of the marked irregularity in the distribution and grain size of the ferrite and pearlite grains found present in many of the specimens. This irregularity was traced to the non-uniform distribution of the phosphorus. A cellular-like structure formed in conjunction with the microstructure normal to these steels was studied and the relationship between this unusual structure and the distribution of phosphorus was established.

R. L. White has been appointed district manager in charge of Detroit office, 809 Kresge Building, Detroit, of the Wilson Welder & Metals Co., Inc., New York, maker of arc welding machines and welding metals.

OBITUARY

WILLIAM C. GRAVES, aged 45, president Graves Machinery Exchange, 50 Church Street, New York, died suddenly at the Richmond Hotel, Richmond, Va., Feb. 27. Mr. Graves, whose home is at Manhattan Beach, L. I., was on his way to his winter home at Miami, Fla. He was born in Louisville, Ky., where he first became interested in the machinery business through operating a small bicycle repair shop in that city. He was for several years a salesman with the Wicks Machinery Co., Jersey City, N. J., leaving that connection to establish the New York Machinery Exchange with L. Bertolette of the Bertolette Machine Tool Co., Jersey City, N. J. Later, when Mr. Bertolette withdrew from the company, Mr. Graves changed the name to the Co-operative Machinery Exchange, becoming associated with C. W. Pritchard and George Bennett. About 1916, when the latter withdrew from the company, Mr. Graves again changed the name. This time to the Graves Machinery Exchange, under which name it now operates.

MORRIS THOMAS, purchasing agent National Enameling & Stamping Co., died Feb. 16 at his home in Milwaukee, aged 51 years. He was connected with the company in various capacities for more than 33 years.

REINHARD MANNESMANN, Berlin, Germany, manufacturer of seamless steel tubing, died in Berlin Feb. 22.

Possible Youngstown Merger

YOUNGSTOWN, Feb. 27.—Possibilities of a merger of independent steel interests in the Mahoning Valley, in event current consolidation negotiations involving scattered plants fail, are being appraised. Principal independents in the Valley district are the Youngstown Sheet & Tube Co., Republic Iron & Steel Co., Brier Hill Steel Co., Trumbull Steel Co. and the Sharon Steel Hoop Co. Of these, the first three have been most prominently mentioned in connection with merger reports.

It is contended that with the Valley interests merged into one corporation, they would be in better position to bring pressure to bear on problems confronting the district. Furthermore, there appears to be a growing disposition that an amalgamation of concerns with plants in different sections may not materialize at this time.

Jeffrey Mfg. Co. Policies

The Jeffrey Mfg. Co., Columbus, Ohio, has made some changes in its sales plans. The company has established a direct action method in place of the old branch office system. The sales forces of the various departments are being condensed and consolidated under direct control of the home office at Columbus. The company also announces the expansion of its department of contract engineering to engage in more extensive and complete engineering projects than has been its policy heretofore, and the Middle States Construction Co. becomes an integral part of this department. The company also intends to still further extend its dealer-agency system, thereby assuring the widest distribution of Jeffrey standardized equipment. Important economies are expected to ensue as a result of the changes.

An exposition of plumbing apparatus and sanitary equipment for buildings is to be held in the General Motors Building, Detroit, in connection with the fortieth annual convention of the National Association of Master Plumbers. A bureau has been established for taking care of the details of the exposition under the business management of E. K. Durham at 484 Penobscot Building, Detroit.

Thermal Expansion of Nickel, Monel Metal, Stellite, Stainless Steel and Aluminum

The increasing use of nickel, Monel metal, stellite, stainless steel and aluminum for spark plugs, steam valves, automobiles and in household and surgical appliances has created a considerable demand for the accurate determination of the thermal expansion of these metals and alloys.

Scientific Paper No. 426 of the Bureau of Standards considers this subject fully. Ten samples of commercial nickel containing from 94 to 99 per cent nickel, five of which were heat rolled and five heat rolled and annealed; 10 samples of Monel metal, 60 to 69 per cent nickel, of which two samples were cast, three hot rolled, and the remaining of various compositions and treatments; five samples of stellite of different grades; two samples of stainless steel and two samples of 99.4 per cent aluminum were used in the work. The conclusions should prove of assistance to engineers using these metals in connection with varying temperatures.

Taylor Society to Meet in Philadelphia

A mid-winter meeting of the Taylor Society will be held at the City Club, Philadelphia, March 16, 17 and 18. The tentative program is as follows:

Thursday afternoon, March 16, "A Case of Sales Research," by John M. Holcombe, Jr., manager sales research division, Phoenix Mutual Life Insurance Co., Hartford, Conn. Thursday evening, "Problems of General Management," by Henry P. Kendall, manufacturer and banker, Boston.

Friday forenoon, "Super-Standards," by Dr. Frank B. and Dr. L. M. Gilbreth, Montclair, N. J. Friday afternoon, "Budget Control," by George E. Frazer, Frazer & Torbet, Chicago. Friday evening, "Mills, Minds and Men," by Arthur Pound, Flint, Mich., author of the articles, "The Iron Man," now appearing in the *Atlantic Monthly*.

Saturday forenoon, "String-Board Graphics," by Percy S. Brown, works manager, Corona Typewriter Co., Groton, N. Y. "The Work of the Balance of Materials Clerk," by Thomas W. Mitchell, Philadelphia.

New Iron Agency in Buffalo

Waldo, Egbert & McClain, Inc., Buffalo, recently chartered under State laws, will engage in a general agency and brokerage business in pig iron, steel, coke, fluorspar, etc. Offices have been opened at 744-46 Marine Trust Building. Fred J. Waldo, president, has been connected with Rogers, Brown & Co. for a number of years, recently resigning to form the new company; Justus Egbert, vice-president, was associated with the American Radiator Co. in different capacities for about 20 years, and at one time was identified with the company's plants in France and England; William J. McClain, secretary and treasurer, resigns from the position of district sales manager at Buffalo for the Republic Iron & Steel Co., to become connected with the new enterprise. He was associated with the Republic company for about 11 years, and previous to this spent four years with the United States Steel Corporation, located in the operating department at Youngstown, Ohio.

Presented a Community House

At a community celebration Thursday evening, Feb. 23, the Carnegie Steel Co. formally presented to the Village of McDonald, in Trumbull county, Ohio, a three-story pressed brick Community House building. It contains assembly rooms, reading, billiard, bowling and other recreational facilities. The building was formally accepted by James A. Freed, mayor of the village. McDonald was created by the Carnegie company for the employees at its McDonald bar mills. The company recently completed the erection of 172 dwellings of modern type, which are sold or rented to employees, as desired. Workers are offered an attractive deferred payment arrangement in case of purchase, and many have taken advantage of this plan. McDonald is located five miles west of Youngstown.

VEHICULAR TUNNEL CONTRACT

Reported That Bethlehem Steel Co. and Davies & Thomas Co. Will Be Awarded Castings

Although the contract for the construction of the New York-New Jersey vehicular tunnel has not yet been formally awarded to the low bidder, Booth & Flinn, Inc., New York and Pittsburgh, it is expected that the papers will be signed within two or three weeks. The delay has been caused by the refusal of the Erie Railroad to vacate certain streets in Jersey City, though the city government has posted notices that these streets will be closed. As yet no legal action has been taken.

Despite this delay, Booth & Flinn, Inc., is understood to have virtually completed arrangements for cast iron and steel segments, fabricated steel and bolts, nuts and washers required in the tunnel work. THE IRON AGE is reliably informed that the Bethlehem Steel Co. will cast 60 per cent of the 105,000 tons of cast iron segments and all of the steel castings, about 9000 tons, and will also fabricate about 10,000 tons of structural steel required in the work. The remaining 40 per cent of the cast iron segments, THE IRON AGE is informed, will be cast and machined by the Davies & Thomas Co., Catasauqua, Pa., which did similar work for the Hudson tubes.

The Bethlehem Steel Co. will, of course, furnish its own pig iron, while it is expected that the pig iron supply for the work to be done by the Davies & Thomas Co. will come from the furnaces of the Empire Iron & Steel Co., Catasauqua, Pa., Leonard Peckitt being president of both companies. According to original estimates about 75,000 tons of pig iron, the remainder scrap, will be required for the castings.

It is further intimated that a large part of the bolts, nuts and washers for the tunnel will also go to the Bethlehem Steel Co., though it is reported that a Pittsburgh company is slated to receive a part of this business. The specifications provide for approximately 1,000,000 nickel steel bolts, the same number of nickel steel nuts and about 2,000,000 washers.

BROADER BUYING

Activity at Youngstown Not Great Enough to Cause Marking Up of Prices

YOUNGSTOWN, Feb. 28.—While lighter steel products are benefiting from current buying, there is a tendency to over-emphasize the movement. Without exception Valley steel makers report that incoming tonnage is on a broader basis, but it still lacks sustaining influence. In finished directions, tin plate makers are in the best operating position. The Trumbull Steel Co., for instance, which ranks as the third largest independent tin-plate interest in the country, has a backlog of unfilled orders which will engage its capacity through March at a rate close to normal.

Buying of strip steel is likewise on a larger scale and production schedules have been accelerated. The principal district interest claims to be holding to a base of 2c. on hot-rolled, though reports of concessions in this market are frequent.

Valley producers believe that in the immediate future any price changes will be in the way of firming current levels and eliminating concessions, rather than actual advances in the nominal market.

In most finished lines buyers are still booking tonnage with considerable caution, deterred by the uncertainties surrounding the whole price structure.

The Ford Motor Co. has come into the market for larger requirements against an increased production schedule in March. Sheets are likewise moving to subsidiaries in the General Motors group, the Dodge Bros., Studebaker and the Fisher Body Corporation, among others. Makers not catering to the auto trade similarly report more activity from other sources. The Republic Iron & Steel Co., for instance, now has eight of 18 sheet mills at its Niles works engaged, as compared with four during the first weeks of February.

Fair Orders for Refractories

PITTSBURGH, Feb. 27.—Business in refractories is feeling quite fully the betterment in blast furnace and steel plant operations. While there is yet no disposition on the part of the iron and steel makers to anticipate their requirements, their needs are increasing and the past few weeks have been marked by fairly numerous, if individually small, orders. The business is well distributed among the different kinds, but relatively is better in silica and magnesite than in fire clay or chrome. Quotations are unchanged, but observance of published prices is not 100 per cent. Less than $53 Baltimore, has been done on magnesite brick, and some concessions are appearing also in fire clay and silica. Chrome brick are not readily sold at more than $40 per net ton works.

We quote per 1000, f.o.b. works:

Fire Clay	High Duty	Moderate Duty
Pennsylvania	$32.00 to $35.00	$30.00 to $32.00
Ohio	30.00 to 35.00	28.00 to 30.00
Kentucky	32.00 to 35.00	30.00 to 32.00
Illinois	32.00 to 35.00	30.00 to 32.00
Missouri	32.00 to 35.00	28.00 to 32.00
Silica Brick		
Pennsylvania		30.00
Chicago		35.00 to 37.00
Birmingham		40.00
Magnesite Brick		
Standard size per net ton (f.o.b. Baltimore)		53.00
Chrome Brick		
Standard size, per net ton		40.00 to 42.00

Ohio Foundry Operations

The trade report of the Ohio State Foundrymen's Association for the month of January shows that the actual melt of 78 foundries reporting was 23 per cent of normal. Figures for the month showed that foundries in operation had received 2715 tons of pig iron and 776 tons of scrap. The actual melt of pig iron and scrap during the month was 6929 tons, and the stock of pig iron reported on foundry yards, as of Feb. 1, was 23,595 tons and scrap 5704 tons. Samuel Powell, Jr., secretary of the association, in the January bulletin, urges the members to send in their complete reports.

The annual meeting of the Ohio State Foundrymen's Association will be held at the Hotel Deshler, Columbus, Ohio, on March 31. The election of five new members of the board of administration and the officers for the ensuing year will take place at this meeting. In addition to the regular business program, the subject of uniform foundry practice will be presented to the association by the committee that has this matter in hand.

Contracting all the maintenance of way and maintenance of equipment work on the Ohio Region of the Erie Railroad has been completed, it is announced from the Youngstown, Ohio, offices of the regional manager. The Meadville Machinery Co., Inc., Meadville, Pa., has been awarded a contract to operate the Meadville car yards, roundhouse and repair shop, the Cleveland roundhouse and repair shop and the Galion shops. This interest has also taken over, effective March 1, all other repair work in the region not covered in previous contracts.

The Williamson & Lawrence Sand Co., Springfield, Mass., has been incorporataed with Robert E. Lawson, president, and Harley F. Williamson, treasurer. The company owns 135 acres of silica sand at Provincetown, Mass., suitable for molding and for glass manufacture, and expects to begin operations on or about March 20.

Mining and Metallurgical Engineers

Continued from page 587)

New Jersey Zinc Co., Franklin, N. J., as the chairman. This meeting was a further step in the movement started a year ago when the first assemblage on this subject came together at the February meeting of the institute. This was described in THE IRON AGE, Feb. 24, 1921.

The session this year was an assemblage of the advisory board, created in the past year by the appointment of representatives of the various technical and engineering societies and consisting of the following appointees:

American Iron and Steel Institute: no one yet appointed; American Society of Civil Engineers: T. R. Lawson, Rensselaer Polytechnic Institute, Troy, N. Y.; American Society of Mechanical Engineers: George T. Cousins, manager mining and drill department Ingersoll-Rand Co., New York; American Society for Steel Treating: H. S. Brainard, metallurgist Ingersoll-Rand Co., Phillipsburg, N. J.; American Society for Testing Materials: Dr. J. A. Mathews, president Crucible Steel Co. of America, New York; Associated General Contractors of America: George H. Clark, chief engineer Holbrook, Cabot, Rollins Corporation, New York; American Institute of Mining and Metallurgical Engineers: B. F. Tillson, assistant superintendent New Jersey Zinc Co., Franklin, N. J.; N. B. Braley, superintendent North Butte Mining Co., Butte, Mont., and Prof. H. M. Boylston, Case School of Applied Science, Cleveland; American Welding Society, represented by the American Bureau of Welding: C. J. Holslag, chief engineer Electric Arc Cutting & Welding Co., Newark, N. J., and Walcott Remington, chief engineer Thompson Electric Welding Co., Lynn, Mass.; Engineering Foundation: Prof. H. M. Boylston, Case School of Applied Science, Cleveland; National Research Council: Bradley Stoughton, 1107 Broadway, New York; Tool Steel Society: no one yet appointed; American Petroleum Institute: Van H. Manning, director of research American Petroleum Institute, 15 West Forty-fourth Street, New York.

All the members of this board were present, with one or two exceptions.

At this meeting the following report, outlining the proposed scope of the research investigation, was submitted by the Bureau of Standards and the Bureau of Mines:

1. A survey, under the direction of the Bureau of Mines, of the present status of the work.
2. Study of drill steels that give the greatest service before failure by breakage:
   (*a*) nature of sections; (*b*) microstructure; (*c*) composition; (*d*) methods of manufacture; (*e*) heat treatment.
   We recommend that this problem be assigned to the Bureau of Mines.
3. Testing of steel for determining:
   (*a*) service qualities; (*b*) development of methods for recording service.
   We recommend that this problem be assigned to the committee on field tests and shop practice, of which F. W. Denton is chairman.
4. Mechanics of failure:
   (*a*) microanalysis; (*b*) nature of stresses; (*c*) detection of incipient failure: (1) magnetic analysis, (2) other methods not destructive of bar steel; (*d*) is failure due to fatigue of metal?
   We recommend that this problem be assigned to the Bureau of Standards.
5. Methods and machine development for accelerated tests: (*a*) nature of forces involved: (1) impact; (2) vibratory compressional waves; (3) combined bending, vibratory, shearing and torsional.
   We recommend that this problem be assigned to the committee on machine development for accelerated tests, of which W. H. Leonard is chairman.
6. Correlation of field tests with accelerated laboratory tests.
   We recommend that this problem be assigned to the chairman of the committees in charge of subjects Nos. 3 and 5, co-operating with representatives of the Bureau of Mines and the Bureau of Standards.
7. Special studies relating to the importance of heat treatment and use of steels best adapted to the drilling of oil and gas wells, and the application of acquired data on rock drills to such work, with special reference to conditions met with in the drilling of oil and gas wells.
   We recommend that this problem be assigned to the Bureau of Mines.
8. Reclamation of depreciated drill steels:
   (*a*) before failure; (*b*) after failure; (*c*) methods of heating: (1) oil-fired furnaces, (2) electric furnaces: resistance (carbon or nichrome), induction (high-frequency or low-frequency), (3) ohmic resistance methods; (*d*) welding of fractured steel: (1) electric, (2) forge.
   We recommend that this problem be assigned to the committee on the reclamation of depreciated drill steels, of which B. F. Tillson is chairman.

This report was adopted substantially as read after some discussion.

Non-Ferrous Sessions

The various meetings of the institute of metals division were presided over by W. H. Bassett, technical superintendent American Brass Co., Waterbury, Conn., and were some of the most profitable ever held by the institute.

A feature was a lecture on "Colloid Chemistry and Metallurgy" by Prof. Wilder D. Bancroft, Cornell University, delivered at a special session, Tuesday morning, Feb. 21, an abstract of which it is hoped may be published later in these columns.

Another feature was the presentation at the last session on Tuesday afternoon by Dr. Zay Jeffries, director of research, Aluminum Castings Co., Cleveland, of an abstract of his work on the "Slip Interference Theory of Hardening of Metals"—a theory which has attracted wide attention and whose importance is generally regarded as considerable. It applies to both steel and non-ferrous metals. Dr. Paul D. Merica, research engineer International Nickel Co., Bayonne, N. J., discussed Doctor Jeffries' theory, characterizing it as of paramount importance and agreeing with most of its phases with one or two exceptions.

Some interesting light on the process of sherardizing was thrown by a paper by Leon McCulloch, East Pittsburgh, Pa., entitled "Experiments with Standardizing." The author gives the composition of such coatings and discusses their life.

Election of Officers

At the annual election of officers, the following were selected:

Arthur S. Dwight, president.
J. V. W. Reynders, vice-president and director.
Dr. A. R. Ledoux, vice-president and director.
Charles F. Rand, treasurer and director (re-elected).
New directors: William H. Bassett, Waterbury, Conn.; Thomas B. Stearns, Denver, Col.; William Kelly, Vulcan, Mich.

The new president is well known as a mining engineer, particularly for his connection with the Dwight-Lloyd sintering process for iron ore.

Walter H. Aldridge, New York, was made chairman of the finance committee; Doctor Ledoux, New York, chairman of the executive committee and Edward DeGolyer, New York, chairman of the membership committee.

The report of the membership committee showed that in 1921 there were 1251 new members placed in the roll, bringing the total to 10,205 after deducting 402 losses from various causes. At the end of 1920 the total membership was 9323. In finances, the deficit which prevailed at the end of 1920 has been wiped out and last year ended with "a creditable balance on hand."

The Banquet

The annual banquet, held on Wednesday evening at the Hotel Pennsylvania, was next to the largest ever held, with an attendance of about 650. The toastmaster was George Otis Smith, director U. S. Geological Survey, Washington, and the other two speakers were the outgoing president, Edwin Ludlow, and the new president, Arthur S. Dwight.

The plant of the Birmingham Steel Corporation, Birmingham, Ala., a Government works during the war period, has been purchased at a bankruptcy sale by the United States Shipping Board for $7,000 and assumption of obligations totaling $123,000. The plant specialized in the manufacture of structural shapes for shipbuilding, and is equipped for a capacity of about 3000 tons of fabricated steel per month.

Roberts Type of By-Product Coke Oven

(*Continued from page* 583)

the upper pass and the lower pass of the recuperator, due to the difference in the temperature of the waste gas in the two passes, does not interfere with the tension on the vertical joints in the recuperator, because with a temperature above 500 deg. Fahr. the coefficient of expansion in silica brick up to about 1200 deg. Fahr. is very small, compared to its expansion from atmospheric temperature up to 500 deg., or its rate of expansion above 1200 deg. Fahr. In other words, the operating temperatures of the recuperator are such that that part of the brick exposed to the lowest temperature comes in the flat part of the line in the expansion curve of silica brick, and will stand a variation of about 300 deg. without sufficient movement to affect the joints.

Our experience at Granite City since we started the plant has been such that we have operated at from 12 to 24 hr. coking time. In changing from one coking time to another we do not find that the overall efficiency of the recuperators for the recovery of heat is materially affected.

It is evident from our experience that the recuperative type of oven can be designed and built to give as good efficiencies as any other method of heat recovery. It will give longer satisfactory service without being affected by the wide swings that may come in operation.

The only question that may be involved in the relative value of a recuperator of this type as against the regenerator is the difference in cost. It is true that it costs more to install the recuperator than the regenerator, if brick only is considered, but in regarding it only from the angle of operation, and offsetting the higher brick cost by the elimination of reversing machines and valves, the relative cost is about the same.

One drawing shows graphically some heat effect curves as they refer to the Roberts coke oven wall. The curve *I* represents the ideal condition, where the heat would be transferred to the coal at an absolutely uniform rate throughout the entire height of the wall. The curve *M* represents the heat effect as it actually happens in the Roberts wall, and the curves *K* and *L* and *R* represent theoretical extremes to which the gases would go if they were not influenced by the conditions existing in the oven.

Theoretically, at the point of the primary gas introduction, the heat effect upon the coal would be according to curve *L*. Due, however, to the fact that 100 per cent of the air is introduced at this point, with only 50 per cent of the gas, and that the combustion starts in the mixing chamber, which is a flue-like structure, the flame temperature is tempered down to curve *K*, and the lower rate of heat transfer from the flue-like structure brings the heat effect line back to the curve *M*.

Below this point the baffle structure starts, and the rate of heat extraction is higher than above, due to the fact that more surface is exposed to the flame, so that the heat effect upon the coal is at a higher rate than would be indicated by the curves *K* or *L*. When getting to the point where the secondary gas is introduced, the curve *R* would be the natural effect for the introduction of this new gas, but it is being introduced in an atmosphere diluted by the products of combustion from the gas above, so that the rate of flame propagation is lower, and is taking place in a baffle wall structure where the rate of heat transference is high, so that the heat effect line as indicated by *M* is at a higher rate than the extremes indicated by curve *R*.

There is a marked decline, of course, in the temperature near the sole; but, due to the fact that the heat is transferred into the coal from three sides at that point, it is desirable to have this decline in temperature.

As the relative temperature of the upper zone compared to the lower is arbitrary, dependent upon the relative quantities of gas introduced at the two points, we consider that, so far as heat effect upon the coal is concerned, we have this well worked out, and high walls are no longer a problem. From a structural standpoint the design of a high wall, if designed in this manner, is also solved, so that, if it is found desirable to build narrow coke oven chambers, and at the same time maintain the tonnage capacity of the oven, it can be done.

We have found that it is not necessary to have narrow coke oven chambers for the production of coke from the Illinois coal, as is very commonly supposed at present. The reason for advocating the narrow coke oven chamber for the many years that we have been carrying on experimental work is not due to this at all, but rather to the idea that greater economy can be obtained by narrow chambers and shorter coking time than by wide coke ovens and longer coking time.

We have demonstrated many times that the width of the oven has nothing to do with the ability to coke these high volatile, high oxygen coals. In fact, we can shut all of the heat off from one side of these ovens and coke the coal entirely from the opposite side, which would be equivalent to approximately a 28-in. oven.

It is our idea that better control can be obtained of the heat conditions throughout a long and high wall, if small quantities of gas are handled at any given point. The gas in the Roberts coke oven is introduced at 96 different points; that is, there are 48 primary orifices and 48 secondary orifices, one-half of which are on each wall. By admitting the gas in this manner it is always easy to inspect the points of inlet. By dealing with a small quantity at an individual point, there is less tendency to have wide variations in the heat effect from combustion.

Contrary to general belief, the velocities of the gases through the wall are slow, and at no point exceed 3.18 ft. per sec. When the gas adjustments are set for some given coking time, a uniform temperature can be obtained upon the wall throughout its entire height.

As stated above, the Granite City plant was designed to use Illinois and Indiana coals, and to operate the blast furnace upon the coke resulting from these coals. This we have successfully done, and the following operating data for January, 1922, will give an idea of what has been accomplished.

Average coking time	14 hr. 56 min.
Average charge of coal per oven	14.5 tons
Total coal per oven per day	23.9 tons
Average coke yield	67.21 per cent
Average coke breeze	3.7 per cent
Average tar yield per ton of coal	7.21 gal.
Average sulphate yield per ton of coal	23.7 lb.
Average total gas yield	10,248 cu. ft.
Average B.t.u. rich gas	593
Average B.t.u. fuel gas	517
Average fuel consumption	60 per cent
Average surplus gas	40 per cent
Average analysis of coal:	
Moisture	8.06 per cent
Volatile	34.51 per cent
Ash	9.35 per cent
Sulphur	1.38 per cent
Average analysis of resultant coke:	
Moisture	4.44 per cent
Volatile	2.47 per cent
Ash	13.06 per cent
Sulphur	1.13 per cent
Average weight per cu. ft.	28 lb.
Shatter test on 2 in.	51.52
Shatter test on 1 in.	86.44
Shatter test on 3 in.	13.12
Shatter test on 4 in.	2.6
Porosity will average	55 per cent

It is interesting to note that the amount of breeze is only 3.7 per cent of the total coke produced, because when using such a large percentage of high volatile coal, it has always been assumed that the breeze losses would be out of proportion to the total coke produced.

From the above it is apparent that the quality of the coke is good, and some of the peculiarities of this type of coal show up. It is evident that it requires more heat to make coke from this coal than out of the coking coals. But the yield of coke is good, and its strength is best evidenced by its use in the blast furnace, the data of which will be given later.

There was nothing unusual during the month's run on the coke ovens. The most significant thing was the uniformity of the coke size and structure throughout the entire month. The coke during the month of January was made from 90 per cent Black Brier, Ill., coal and 10 per cent Pocahontas.

To determine the relative value of the coke in the blast furnace as compared to last month, starting on

Feb. 1, the plant was put on 100 per cent Illinois coal, consisting of 75 per cent Black Brier and 25 per cent Orient. The Black Brier mine is in Williamson County and the Orient property in Franklin County. So far this month, practically the same results have been obtained in furnace practice with the 100 per cent Illinois coke, the only difference being that the rich gas is running higher in heat value than last month and the tar yield is slightly higher.*

Based on this, there is great doubt in our minds as to whether the mixture of any low volatile coal with the Illinois coals will give better results in the blast furnace, and everything at the present time indicates that we will get as good furnace practice and as low coke consumption on the 100 per cent Illinois as with the mixed coals.

The following report by Chas. R. Holzworth, general superintendent St. Louis Coke & Chemical Co., on the operation of the blast furnace during the month of January, upon the coke mentioned above, gives a better idea of comparison to established practice than anything else:

Attached is a tabulation of the results, which shows capacity of furnace 19,853 cu. ft.; pig per 100 cu. ft. capacity 2.46 tons; average tonnage for the month, 488, on coke consumption of 1875 lb. per ton of pig. The limestone used per ton of pig was 1121 lb., and ash in coke 13.06 per cent, both of which are higher than used in good practice, such as is shown for No. 6 furnace, South Works, in the Year Book of the American Iron & Steel Institute for 1920.

As a matter of interest, if January, 1920, data on No. 6 furnace are used for a basis, we can calculate what our production and coke consumption would have been on the same limestone per ton of pig, and the same ash in coke, disregarding the smelting quality of the mixtures of ores. There is no method known whereby to determine the relative amounts of coke required to smelt mixtures of Old Range and Mesabi ores, although it is generally conceded that a Mesabi mixture reduces more easily than the Old Range mixture, with consequent lower fuel consumption per ton of pig.

The most important data on No. 6 furnace are shown in parallel columns with that of our furnace; one column for our furnace showing results obtained, and another column results that can be expected on the same basis of limestone used per ton of pig and per cent of coke ash.

Comparative Data

	No. 6	Frances	Frances on Comparative Basis
Capacity, cu. ft.	27,750	19,853	19,853
Tons per 100 cu. ft. capacity	2.25	2.46	2.67
Average tons per day	625	488	530
Average coke consumption	1,890	1,875	1,688
Lb. stone per ton pig	611	1,121	611
Scrap used over produced, per ton of pig, lb.	56	109	109
Per cent Mesabi ore	100	22.2	22.2
Ash in coke, per cent	11.0	13.06	11.0
Cu. ft. per minute at 60 deg., lost time deducted	42,871	34,200	34,200
Cu. ft. air per lb. coke	.....	53	54.1
Blast temperature	1,107	1,036	1,036
Top temperature	.....	264	.....
Actual yield	49.68	51.8	51.8
Average silicon, per cent	1.01	0.81	0.81
Average sulphur, per cent	0.039	0.040	0.040
Dust per ton of iron, lb.	229	88	.....

(*To be concluded*)

*Editor's Note: The blast furnace report of Feb. 11 showed a production of 543.8 tons, with a consumption of 1756 lb. of coke per ton of iron. The analysis of the coke was as follows: Moisture, 5.00 per cent; ash, 12.26 per cent; volatile, 0.84 per cent; sulphur, 1.05 per cent. Analyses of the five casts showed silicon ranging from 0.68 to 1.36 per cent; sulphur from 0.035 to 0.047 per cent; phosphorus, 0.220 to 0.231; manganese, 0.59 to 0.69 per cent.

American Incomes, Farmer and Otherwise

Figures prepared by the National Bureau of Economic Research show estimates of the aggregate individual incomes in the United States for the calendar years of 1910 to 1920 inclusive. Appended to these figures are the estimated aggregate incomes of the farm communities, both in dollars as received and in equivalent dollars based on 1913 prices. Based upon the aggregate figures, average individual incomes have been computed in 1913 dollars in two groups, one covering all those gainfully employed, as expressed in census statistics, while the other includes the farmers only.

It will be noted, from the table appended, that the farmers' percentage of the aggregate incomes during the years 1910 to 1916 inclusive varied between 12 and 14. In the three years of guaranteed prices on farm products, the farmer received about 17 per cent of the total income. Collapse of farm prices in 1920 cut down the farmers' proportion of 10.9 per cent of the total. Expressed in another way, the average income of all those gainfully employed varied in 1910 to 1919 inclusive between $920 and $1,060, in dollars of 1913 purchasing power. During this same period, the average farmer's income in 1913 dollars varied from $593 to $1,011.

Calendar Year	Billions of Dollars: Aggregate Individual Incomes	Billions of Dollars: Aggregate Farmers' Incomes	Billions of Dollars: Farmers' Incomes, 1913 Basis	Farmers' Percentage of Total	Average Income in 1913 Dollars: All Gainfully Employed	Average Income in 1913 Dollars: Farmers	Farmers' Percentage
1910	30.0	3.95	4.01	13.2	940	631	67.1
1911	30.2	3.7	3.78	12.3	923	593	64.3
1912	31.5	4.0	4.04	12.7	939	624	66.5
1913	32.5	4.2	4.20	12.9	955	657	68.8
1914	32.2	4.2	4.17	13.0	932	652	70.0
1915	34.3	4.7	4.59	13.7	1,000	717	71.7
1916	41.8	5.8	5.10	13.9	1,060	795	75.0
1917	50.7	8.8	6.45	17.4	1,025	1,004	97.9
1918	60.2	10.45	6.50	17.4	941	1,011	107.4
1919	64.7	10.85	6.10	16.8	938	947	101.0
1920	65.8	7.2	3.50	10.9	850	543	63.9
Average	43.1	6.17	4.77	13.0	955	743	77.8

The average farmer's income, which was about two-thirds of the total average for the country in the early years of the decade, reached in 1918 and 1919 a figure greater than the average for the rest of the country. In the year 1920, however, the farmer's proportion dropped off much more heavily than that of the rest of the country, which fact is responsible for many political and other movements now engaging the attention of the public press.

Restraining Order Against Wheeling Strikers Extended

Holding that "the right to work is open to all and one cannot be accosted or interfered with unlawfully merely because he chooses to work in an open shop or mill," Judge Addleman in the circuit court at Wheeling, W. Va., on Feb. 23, extended the restraining order of last August, directed against striking employees of the Wheeling Steel & Iron Co., to include a number of other locals, including the Crescent lodge of the Amalgamated Association of Iron, Steel & Tin Workers of North America, on petition of the plaintiff in the original case. A temporary injunction was allowed restraining the defendants from molesting non-union or other workers at the Yorkville, Ohio, mills of the Wheeling Steel & Iron Co. The first injunction dealt with picketing and interference on the part of strikers at the Belmont plant of the company. This new order merely enlarges the scope of the injunction to cover operations in Yorkville and follows an injunction of similar tenor recently granted by the United States district court at Columbus, Ohio. One paragraph of the restrictions imposed on the strikers lays down the general proposition that "the union has no right under the law superior to a non-union man and there must be no interference with any of these rights by any of the defendants."

Electrical resistivities of different resistor materials are being determined under different conditions of temperature, pressure, purity, etc., at the Northwest Experiment Station of the Bureau of Mines at Seattle, Wash., by Prof. G. R. Shuck of the University of Washington. It is hoped that these data will be of value in designing furnaces which use a resistor as the heating element or which make use of carbon as a reducing agent, and also in the manufacture of electrodes.

NEW WORKING RULES

Abuses of Labor Unions Abandoned as Decree Is Accepted

A consent decree, drawn and signed in Washington, Feb. 24, established new working rules for approximately 119,000 members of the Bricklayers, Masons and Plasterers' International Union of America. These new rules are directly opposed to many of the rules of the American Federation of Labor.

The decree followed a conference with Attorney General Daugherty with the leaders of the union. It will be entered in the United States Court in New York.

The work of preparing a decree that would be accepted by more than 50 representatives of the various locals throughout the United States and by the Government followed research and inquiry on the part of the Federal officials for nearly four months.

The conviction and imprisonment of several persons charged with violation of the Sherman law, the voluntary disintegration of illegal combinations and the pending trials of others operated favorably in obtaining the consent of the union to discuss the matter with the authorities.

As finally prepared the decree provides in brief:

1. There is to be no limit to the productive capacity of the individual workman within the working day or any other time.
2. There is to be no limit upon the right of the employers to purchase their material wherever and whenever and from whomever they may choose, whether these materials be union made or otherwise.
3. There is to be no favoritism shown by organized labor toward employer or trade associations and no discriminations are to be indulged in against the independent employer who may not be a member of such an organization.
4. The labor organization is not to be used, or permit itself to be used, by material men or contractors or subcontractors as an instrument for the collection of debts or enforcement of alleged claims.

Employee Representation Defeated

The employees of the General Electric Co. at Schenectady, N. Y., have defeated the Rockefeller or American shop plan by a vote almost two to one. There were 5704 votes against the plan and 3549 in favor of its adoption.

When working with a full force the plant has 22,000 employees, and the vote was approximately less than half of that number, but many men have been idle some time, owing to business depression.

Industrial representation as expressed by the proposal was the result of weeks of careful study by a committee of 14, eight selected from among the employees and six by the company. Their draft was submitted to a committee of 250 selected from all sections of the plant. This committee approved the plan.

Under the terms of the defeated plan the plant would have been divided into 12 sections and the sections, in turn, into election districts. Each election district was entitled to one representative and one alternate representative for each 150 employees, or fraction thereof, in the district, their terms of office to be one year. Day workers elected to the committees would have been paid their day rate and piece workers their average piece workers' earnings for time spent on committee work.

Labor Conditions in Pennsylvania

HARRISBURG, PA., Feb. 28.—Slight improvement in general conditions in the iron and steel trade is shown in the semi-monthly report of the Pennsylvania Department of Labor and Industry for the period ending Feb. 15. Three offices report conditions improved, while one reports that conditions have become more slack.

The McKeesport branch office optimistically reports that the main plants of the iron and steel mills of the district are operating nearer to capacity than they did at any time during 1921. This has brought about a great reduction in the total amount of unemployment in the district.

Johnstown and Altoona are the other offices to report improvement. "Marked improvement" in the iron and steel trade was attributed by the Johnstown office to have materially helped in the decrease of 3700 in the number of unemployed. Re-hiring of workers in the railroad shops at Altoona has brought relief there, the Altoona office reports.

Scranton, the sole office to report worse conditions, says that "the laying off of metal workers and the slump in the mines and building have resulted in an increase of about 5500 in unemployed."

Conditions generally throughout Pennsylvania were about the same at the end of the period as they were at the start, according to Commissioner Clifford B. Connelley. Sporadic increases and decreases were reported, but the total number of idle in the entire State on Feb. 15 was reported to be 313,575.

Shift Workers in American Industry

More than 500,000 shift workers are employed in American industries, according to a report of the committee on work periods in continuous industries of the American Engineering Council of the Federated American Engineering Societies made public a few days ago.

Chairman H. E. Howe of the National Research Council said that the conclusions of the committee are based on a nation-wide survey of "an unexplored field" conducted under the direction of Dr. Horace B. Drury, formerly of the faculty of Ohio State University. The survey is now complete with the exception of certain regions of the South and Far West.

Labor efficiency, it is indicated, is higher with three shifts of eight hours each than with two 12-hr. shifts. Continuous operation, according to the engineers, was found to constitute a great social and industrial problem.

"While the committee plans a further engineering study in the steel industry," says the report, "its investigations to date have been in industries other than steel. It has been found that the extent of continuous operation industry outside of steel is greater than had been supposed. There are well up to 40 or 50 industries which involve a greater or smaller amount of continuous operation in all or a portion of the country's plants.

"Very roughly, the number of shift workers in the United States is probably well over 500,000, though likely not as large as 1,000,000. And the number of men on 12-hr. shifts, in the period preceding the depression, was perhaps not far from 300,000, of which about as many were outside the steel industry as in the steel industry."

Will Study Unemployment

WASHINGTON, Feb. 28.—Consistent with the previously expressed opinion of Secretary of Commerce Hoover that the question should be studied further because it is made the object of legislation, the fundamentals of unemployment and control of the business cycle are to be the subjects of a thorough investigation by a special committee of the President's Conference on Unemployment. The committee was selected at a meeting held at the Department of Commerce on Monday of last week and will report to the Conference on Unemloyment and the public in about six months. The committee consists of Owen D. Young, vice-president General Electric Co., New York, chairman; Joseph H. Defrees, president, Chamber of Commerce of the United States; Clarence Mott Woolley, vice-president American Radiator Co., New York; Matthew Woll, vice president American Federation of Labor and Miss Mary Van Kleck, Russell Sage Foundation, New York. Edward Eyre Hunt, secretary of the President's Conference on Unemployment, was appointed secretary of the committee, and Wesley C. Mitchell, New York, was made field director of the study.

The Champion Engineering Co., Kenton, Ohio, manufacturer of electric traveling cranes, has added more than 100 men to its working force as a result of a recent increase in orders.

Machinery Markets and News of the Works

FEBRUARY SALES DROP OFF

Machine-Tool Trade in Past Month Not So Active As in January

Inquiries Are Fairly Numerous But Prospective Buyers Are Slow in Placing Orders

Inquiries for machine tools are more numerous than orders. Prospective buyers are slow in closing. Used tools are in better demand than new tools, this situation being largely due to the very low prices quoted on used machines in good condition.

Sales in nearly all selling centers dropped off in February as compared with January. In some markets there are signs of improvement, but the situation is spotty, and, on the whole, the industry sees no promising indications of early resumption of satisfactory activity.

It is believed that marked improvement in the industrial situation must come as a prelude to better buying of machine tools. In this respect, however, there are some gains. It is reported from the Cleveland district that foundries are generally operating at 30 per cent as compared with a low point of 20 per cent last year. New England metalworking plants are slowly increasing the number of operating hours.

A few fairly good-sized orders have been placed, notable among which is that of the Franklin Motor Co., Syracuse, N. Y., for about 30 machines. The General Electric Co., Lynn, Mass., has bought several large milling machines, but most of the equipment listed on its recent inquiry for 42 machines will be moved from other plants. The H. B. Smith Co., Westfield, Mass., has closed on the remainder of its recent list. A Cincinnati manufacturer bought about $10,000 worth of tools. The P. H. Murphy Co., New Kensington, Pa., recently bought several Bliss and Toledo presses.

There is very little railroad buying, such orders as that of the Maine Central for an 80-in. driving wheel lathe and a 60-in. boring, drilling and milling machine being conspicuous. The Santa Fe has bought several tools and the Chesapeake & Ohio is reported to have selected several used tools at the Hog Island shipyard. Requirements of its subsidiary road, the Hocking Valley, numbering seven machines, may be satisfied at the same source.

The Ward Baking Co., New York, is out with an inquiry for about 30 metalworking and woodworking machines, in addition to chucks, vises, etc., for a motor truck shop. The Springfield, Mass., plant of the Westinghouse Electric & Mfg. Co., which is busy on radio apparatus, may close soon on several tools.

New York

NEW YORK, Feb. 28.

February business in machine tools in this market did not show as large a total as that of January. There are few inquiries and fewer orders. Buying of new tools is restricted considerably by the number of used tools in good condition which are offered at prices varying from 25 to 50 per cent of the prices asked for new machines.

The McCabe & Shearan Machinery Corporation, Singer Building, New York, has sold a used 16-ft. boring mill to a Cleveland manufacturer; a 6-ft. Bullard boring mill to a Canadian company, and an 8-ft. Niles mill to a New Jersey company.

The Ward Baking Co., New York City, which is planning to equip a shop for building motor trucks for its own use, has inquired for the following metalworking and woodworking machines.

One threading machine (bolt cutter).
One circular metal saw.
Two 18-in. stationary head drill presses.
One No. 1½ milling machine with index head and centers.
One 20-in. shaper.
One 26-in. x 12-ft. lathe.
One 16-in. x 10-ft. lathe.
One 16-in. x 6-ft. lathe.
One 11-in. x 6-ft. speed lathe.
Three 16-in. four-jaw chucks.
Three 10-in. three-jaw universal Westcott chucks.
Three sets Armstrong lathe tools.
One No. 5 emery grinder.
One No. 3 emery grinder.
One No. 2 emery grinder.
One American universal saw bench.
One American single surfacer, 30 in.
One American 24-in. jointer.
One two-spindle shaper.
One No. 2 borer.
One No. 20 hollow chisel mortiser.
One No. 10 band saw, 36 in.
One No. 1 rip saw.
One motor-driven swing saw.
One 14-in. inlet Buffalo forge blower.
One 5-ft. dust collector.
Eight woodworking vises.
18 Monarch vises.
Two direct-connected motor-driven forges.
One power hack saw.
One Buffalo No. 45 combination punch and shear.

The crane market continues dull as far as actual purchasing is concerned, but inquiries continue to appear from time to time. Considerable activity is manifest in chain blocks in capacities varying from 1 and 2 tons to as high as 20 tons. One hand-power hoist inquiry, for export to Brazil, comes through H. E. Braisted & Co., 32 Broadway, New York, and calls for quotations on eight 20-ton chain hoists and several boxes of chain. Among recent chain block purchases were eight 2-ton hoists to the Bethlehem Steel Co. for the Wilmington plant, placed with the Chisholm-Moore Mfg. Co. This company has also booked an order for 12 1-ton, 12 1½-ton and 12 2-ton chain blocks for export to Japan.

Revised bids have been submitted on a revival of the inquiry of F. L. Smidth & Co., 50 Church Street, New York, for a 10-ton crane with 3-yd. bucket for the Glens Falls-Portland Cement Co., Glens Falls, N. Y.

Among recent sales were: Grey Steel Products Co., 111 Broadway, New York, two 30-ton, 50-ft. boom used Browning locomotive cranes and one 20-ton used Browning locomotive crane from Philip T. King, 30 Church Street, New York; Kelsey Motor Co., Newark, N. J., two crane runways and two 1000-lb. capacity electric hoists from the New Jersey Foundry & Machine Co.; David H. Smith & Sons, Brooklyn, N. Y., a 7½-ton transfer crane from the Shepard Electric Hoist Co.

The National Marble & Slate Corporation, 236 West Fifty-fifth Street, New York, is arranging for the establishment of a plant for cutting, shaping, polishing and other operations, and will purchase machinery, including traveling crane, etc. A stock issue of $49,000 has been arranged to finance the project. John J. Burns is president, and James D. Corsa, secretary and treasurer.

The New York Central Railroad, W. C. Bower, purchasing agent, 466 Lexington Avenue, New York, is taking bids

until March 6 for one 2000-kw. synchronous motor-generator set, with appurtenances, switchboard, etc.

The Fitzgerald Brothers Brewing Co., 490 River Street, Troy, N. Y., is having plans prepared for remodeling its two-story plant, 120 x 140 ft., for an ice-manufacturing and cold storage works, estimated to cost about $200,000, including machinery. Ophuls, Hill & McCreery, 112 West Forty-second Street, New York, are engineers.

The Van Ness Sanford Co., Inc., Potsdam, N. Y., is arranging a list of equipment for installation at its general machine and automobile repair works. H. J. Sanford is head.

Albert Oliver & Son, 1 East Forty-seventh Street, New York, manufacturers of fireproof building materials, have leased the five-story and basement building at Jackson Avenue and 140th Street, on site 100 x 117 ft., for a new plant.

The Cerro de Pasco Copper Corporation, 15 Broad Street, New York, is making inquiries for 35 steel cars to be used for concentrate transportation at its mining properties.

The New York Edison Co., 130 East Fifteenth Street, New York, has completed plans for a two-story and basement power house at 33 Attorney Street, to cost about $75,000. William Whitehill, Sixth Avenue and Forty-first Street, is architect.

The Prudential Iron Works, 633 Concord Avenue, New York, has acquired property, 75 x 100 ft., on 140th Street, adjoining the tracks of the New York, New Haven & Hartford Railroad, for the erection of an addition.

The United States Shipping Board Emergency Fleet Corporation, Washington, will soon offer for sale three dry docks, each of 10,000 tons lifting capacity, sectional type, with operating pumps, electric drive, etc., now located at Mill Basin, Brooklyn, and Tiverton, R. I.

The International Combustion Engineering Corporation, 43 Broad Street, New York, has arranged an appropriation for the construction of a new foundry at the works of its French subsidiary, Lopuloo Pulverized Fuel Systems, and will commence work at an early date. Erection is under way on a foundry at Derby, England, for its British organization, the Underfeed Stoker Co., Ltd., to eliminate the necessity for having castings made in outside shops.

The Precision Thermometer Corporation, New York, has leased a floor in the building at 222 East Forty-second Street for local works.

The Standard Oil Co., Bayonne, N. J., has filed plans for an addition to its Constable Hook refinery to cost $48,000.

A vocational department will be installed in the new high school to be erected at Toms River, N. J., estimated to cost $200,000. C. F. Cook, Asbury Park Trust Building, Asbury Park, N. J., is architect.

The Public Service Gas Co., Public Service Terminal, Newark, N. J., will install a new condenser, boiler and other equipment at its plant at Paterson, N. J.

The Water Commission, East Orange, N. J., is planning for the installation of new pumping machinery at the White Oak Ridge waterworks. An appropriation of $200,000 is being arranged for the extension.

The F. W. Wells Motor Sales Co., 225 Cookman Avenue, Asbury Park, N. J., will soon take bids for a two-story service and repair building to cost about $50,000.

The Artistic Metal Products Corporation, Newark, N. J., has leased the three-story and basement factory at 91 New Jersey Railroad Avenue for a new plant to manufacture metal specialties. Improvements will be made at once and machinery installed.

The Bayonne Steel Products Co., affiliated with the Bayonne Steel Ceiling Co., 223 West Nineteenth Street, New York, will soon take bids for a two-story building, 105 x 219 ft., at Clinton and Jelliff avenues, Newark. Carl I. Goldberg, 437 Broadway, Bayonne, N. J., is architect.

New England

BOSTON, Feb. 28.

The machine-tool market was quiet the past week. The most important development was in connection with the recent inquiries put out by the General Electric Co., West Lynn, Mass., for 42 tools for work requiring fine measurements, and for miscellaneous heavy duty equipment. The company purchased a few large milling machines, but abandoned the remainder of the list, having substituted equipment heretofore used in other departments of the West Lynn and subsidiary plants. The H. B. Smith Co., Westfield, Mass., heating appliances, closed on the remainder of its machine shop equipment, and the Maine Central has purchased one 80-in. driving wheel lathe, a 60-in. horizontal boring, drilling and milling machine, motor driven, with 4½-in. bar, and an 18-in. lathe. Other sales include a 30-in. x 12-ft. motor-driven lathe to the Worcester Electric Light Co., and a few smaller single lathes, upright drills, etc. The Stevens-Duryea Co., Chicopee Falls, Mass., is in the market for a squaring shear.

Several local houses report numerous new inquiries for single machines, and Providence dealers also have good prospects. Dealers in other sections of New England report business quiet. The belief is general here among the more important firms that February bookings will show a considerable falling off as compared with January. Sentiment is hopeful, however, it being pointed out the aggregate number of live prospects, eliminating the General Electric Co., has not lessened the past fortnight. Industrial New England is slowly increasing its operating hours, taken collectively, but the situation is still more or less spotty. The settlement of the textile labor situation will, it is generally believed, be a signal for better buying of machine tools.

The Hygrade Lamp Co., Salem, Mass., is having plans prepared for a contemplated four-story, 50 x 100-ft. unit to be used by the engineering, testing and packing departments.

A large overhead crane, operated in the gun room of the Builders' Iron Foundry, 9 Codding Street, Providence, R. I., recently was badly damaged by fire, as was a part of the foundry.

Michael Di Leo, Port Chester, Conn., coal dealer, plans the erection of a 80 x 128-ft. coal bunker, with 300-ton capacity. Conveying machinery, etc., will be required.

Construction on a $4,000,000 repair shop at South Everett, Mass., for the Boston Elevated Railway Co., Boston, will begin in May and be completed in one year. It will consist of three units, one 356 x 650 ft., and two, 50 x 150 ft. Eventually, it is planned to consolidate most of the company's repair shops in the new Everett plant. Machine tool requirements have not yet been prepared, but are expected within a short time.

The Fabric Machine Co., 307 Center Streeet, Bridgeport, Conn., filed a certificate of incorporation Feb. 20 to engage in the manufacture of cloth-cutting and winding machinery. It has been organized by Joseph J. Musante, who purchased the buildings, machinery and business of the late A. L. Adams last December. The capital stock is $5,000 and the incorporators, besides Mr. Musante, include Clifford J. Lewis and Arthur E. Bromley. Arthur Sullivan will be general manager.

The city of Middletown, Conn., is planning to erect a trade school at the corner of Church and Main streets to cost about $40,000. Frank A. Coles, 138 Main Street, is chairman of the committee.

The H. L. Judd Co., 42 Cherry Street, Wallingford, Conn., fancy hardware manufacturer, has let contract for its six-story reinforced concrete addition, 75 x 102 ft. Lockwood, Greene & Co., 60 Federal Street, Boston, are the engineers, and John W. Ferguson, 253 Broadway, New York, has the general contract.

A vocational department will be installed in the new high school to be erected at Palmer, Mass., for which an appropriation of $170,000 has just been approved. E. C. and G. C. Gardner, 33 Lyman Street, Springfield, Mass., are architects.

Underhill Brothers, 6 Sherman Street, Charlestown, Mass., manufacturers of hardware, have filed plans for the erection of a one-story factory, 50 x 100 ft., on Winthrop Avenue, Somerville, Mass.

A vocational department will be installed in the new high school to be erected by the School Board, Belchertown, Mass., appropriation for which has just been approved.

The Lynch Brothers Carriage Co., Chelsea, Mass., has foundation work under way for a one-story addition to approximate 8000 sq. ft. of floor space.

The Bush Mfg. Co., Wellington Avenue, Hartford, Conn., manufacturer of automobile radiators and other metal products, has completed plans for a one-story addition, 50 x 250 ft. Buck & Sheldon, Inc., 60 Prospect Street, Hartford, are architects.

The Victor Page Motor Corporation, 301 Lafayette Street, New York, has awarded a contract to the Truscon Steel Co., 110 West Fortieth Street, for a one-story plant, 50 x 105 ft., on Melrose Avenue, Stamford, Conn., to cost about $25,000. The company is now operating a works at Farmingdale, L. I.

A one-story power house will be erected by the Velvet Textile Corporation, P. O. Box 1962, New Haven, Conn., in connection with a new factory to cost about $100,000, at Allingtown. D. E. Smith, 152 Temple Street, New Haven, is architect.

Herbert B. Rust, Meredith, N. H., and associates are planning the construction of a hydroelectric power plant on the Pemigewasset River, vicinity of Manchester, N. H., with transmission system to furnish power at Ashland, Wolfeboro, Plymouth, Bristol and vicinity.

A vocational department will be installed in the new high school to be erected at Belfast, Me., three stories, 140 x 150 ft., estimated to cost $150,000. Kilham, Hopkins & Greeley, 9 Park Street, Boston, are architects.

Chicago

CHICAGO, Feb. 27.

Sentiment has improved in the local machinery district because of the more active interest taken in the market by buyers, but thus far inquiries have greatly outnumbered sales. Orders for single machines predominate and used equipment continues to move faster than new tools. One dealer, however, reports the sale of a 34-in. boring mill, a 16-in. shaper, a 20-in. shaper, and a No. 3 milling machine, all new tools, within the past week. The Santa Fe continues to make a few purchases against its outstanding list from time to time. For La Junta, Colo., it has ordered a 48 x 48 x 12-ft. motor-driven planer, and for San Bernardino, Cal., it has bought a 15-ton overhead traveling crane. The Burlington is preparing an extensive list which is expected to be issued within a week or two.

C. H. Berglund, manufacturer of automobile bodies, 2630 Wentworth Avenue, Chicago, is taking bids on a one-story plant, 100 x 125 ft., on Sixty-seventh Street near Park Avenue, to cost $75,000.

The Elgin Stove & Oven Co., 14 Chicago Street, Elgin, Ill., plans to construct a two-story factory to cost $50,000.

The American Clutch & Machinery Co., recently organized, is about to start operations at 1842 East Miner Street, Desplaines, Ill. It will manufacture steel clutches for shafting and will also do general machine shop work.

At a special election at Muscatine, Iowa, a $350,000 bond issue was authorized for the construction for a municipal electric light and power plant.

At the recent annual meeting of the Rockford Steel Equipment Co., Rockford, Ill., it was voted to raise the capital stock to $150,000 to finance the provision of larger quarters to take care of the company's growing business. W. H. Hendrickson is president and general manager.

The Atlas Powder Co., Wilmington, Del., contemplates the erection of a $2,000,000 powder plant at Pinckneyville, Ill.

The City Council, Red Wing, Minn., has passed an ordinance calling for the erection of a municipal light and power plant. Three years ago the city authorized the issue of $350,000 worth of bonds for the construction of such a plant, but this was delayed owing to arrangements made with the Wisconsin-Minnesota Light & Power Co.

The Central Illinois Public Service Co. has purchased 180 acres of land two miles north of Grand Tower, Ill., as a site for a $2,000,000 power plant.

C. G. Budig, McCook, Neb., will start the construction of a machine shop, 32 x 75 x 100 ft. about March 1. The building will cost $250,000 and will be used for general machine shop work and automobile truck and tractor repairs.

Abraham Mikell, 1311 Washburn Avenue, Chicago, has taken bids on a two story garage, 72 x 107 ft. at the north east corner of West Taylor Street and Garibaldi Avenue to cost $50,000.

The Chicago Union Station Co. will soon take bids on the construction of a power plant at Harrison and Canal streets, Chicago.

The L. W. A. Bunge Mfg. Co., recently incorporated with $20,000 capital stock, has leased space at 2638 West Madison Street, Chicago. It will engage in general machine shop business and is fully equipped with machine tools for the time being. The officers are L. W. A. Bunge, president and treasurer; H. C. Dawson, secretary, and H. D. Bunge, vice-president.

The American Cabinet Co., 3021 North Crawford Avenue, Chicago, has let a contract for a one-story plant, 100 x 125 ft., to cost $40,000.

Fred R. Chandler, 3817 North Pennsylvania Street, Indianapolis, has completed plans for a four-story automobile service and repair building, 60 x 200 ft., on West Vermont Avenue, estimated to cost $125,000. Vonnegut, Bohn & Mueller, 610 Indiana Trust Building, are architects.

The Lampman Tool Co., Angola, Ind., is planning for the installation of new machine tools and other equipment. H. W. Lampman is manager.

A vocational department will be installed in the new high school to be erected at Shelburn, Ind., plans for which have been prepared.

The Evan L. Reed Mfg. Co., Sterling, Ill., manufacturer of metal display stands, racks, etc., has completed plans for a three-story and basement addition, 40 x 90 ft., estimated to cost in excess of $125,000, with equipment. Evan L. Reed is president and general manager.

The Union Light, Heat & Power Co., Fargo, N. D., has preliminary plans under way for a new electric power plant near Broadway and Roberts Street.

The Illinois Central Railroad Co., 135 East Eleventh Place, Chicago, is arranging a preferred stock issue to total $50,000,000, to be disposed of in allotments over a period of years, the larger part of the proceeds to be used for the electrification of its system in the Chicago district, including about 100 miles of line, power plants, electrical equipment, etc., with new passenger terminal and other work.

The Union Utilities Co., Rutland, Iowa, is having plans prepared for a new hydroelectric generating plant near Rutland, estimated to cost about $150,000. Toltz, King & Day, Inc., 1410 Pioneer Building, St. Paul, Minn., are architects and engineers.

A vocational department will be installed in the three-story and basement high school to be erected at Fort Madison, Iowa, 157 x 190 ft., estimated to cost about $350,000. Owen, Payson & Carswell, American Bank Building, are architects.

The Common Council, Hillsboro, N. D., will soon take bids for the construction of a municipal electric light and power plant. The C. L. Pillsbury Co., 1200 Second Avenue, South Minneapolis, Minn., is engineer.

A vocational department will be installed in the new senior and junior high school to be erected at Ainsworth, Neb., W. A. Sawyers, secretary, bids for which are being taken until March 20. Davis & Wilson, Lincoln, Neb., are architects.

The Common Council, Centralia, Ill., will commence the immediate erection of a one-story municipal power plant, 50 x 105 ft., to cost about $85,000.

Philadelphia

PHILADELPHIA, Feb. 27.

The Moore-White Co., Fifteenth Street and Lehigh Avenue, Philadelphia, manufacturer of machinery and parts, has commenced the construction of a two-story foundry addition, 60 x 165 ft., estimated to cost about $35,000.

The Grissinger Machine Works, 904 Quarry Street, Philadelphia, has leased the first floor and basement of the building at 236 Quarry Street, for extensions.

The Champion Incandescent Light Co., 235 Market Street, Philadelphia, manufacturer of lighting fixtures, has purchased the building at 635 Market Street, for $125,000. Alterations and improvements will be made, and the structure occupied as a new plant.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids under schedule 9461 until March 7 for 1800 socket wrenches for the Philadelphia Navy Yard.

The Electrical Foundry & Equipment Co., Philadelphia, has construction under way on a new plant at Tacony and Bleigh streets, estimated to cost about $200,000, including machinery. It will specialize in steel castings, with facilities to manufacture castings up to 200 lb. William P. Cunningham is president.

Thomas E. Millership, 3243 Germantown Avenue, Philadelphia, operating a brass manufacturing and refinishing works, has had plans prepared for an addition. Improvements will be made, also, in the present building.

The Bureau of Highways, City Hall, Philadelphia, has arranged a list of machine tools to be purchased for its new automobile service and repair works, including engine lathes, drill press, power hack saws, shaper and portable floor crane. F. H. Craven, room 216, is director.

A one-story power house will be constructed at Fifth and Annsbury streets, Philadelphia, by the Oscar Nebel Knitting Mills., 3860 Coral Street, for mill service. It will cost $75,000.

John M. Greene, Drexel Building, Philadelphia, is making inquiries for a used compound 12 x 12-in. air compressor, from 400 to 500 cu. ft., operating at 100 lb. pressure.

The International Harvester Co., 606 South Michigan Avenue, Chicago, has taken title to property on Sixteenth Street, Philadelphia, 100 x 194 ft., for $62,000, to be used for the erection of a local branch.

Joseph Kalter Co., 1621 Ridge Street, Philadelphia, manufacturer of lighting fixtures, has leased the first floor of the building at 19 North Ninth Street, opposite its present branch works, for extensions.

A vocational department will be installed in the three-story and basement high school addition to be erected at Ford City, Pa., bids for which will be asked early in March. W. G. Eckles, Lawrence Savings & Trust Building, New Castle, Pa., is architect.

The East Penn Foundry Co., Macungie, Pa., will operate a nickel-plating department in connection with its casting room for plumbing fixtures. Heretofore this work has been handled in outside shops. The company has other extensions and improvements under way.

The Crescent Truck Co., Lebanon, Pa., recently organized, has taken over the factory of the Hunsicker Engineering Co., 167 North Tenth Street, previously used for machinery manufacture, which it will use for the manufacture of small storage battery trucks.

Fire, Feb. 18, destroyed a portion of the plant of the Welliver Hardware Co., Danville, Pa., with loss estimated at about $75,000, including equipment.

A one-story power house will be erected at the plant of the York Sanitary Milk Co., North George Street and Hamilton Avenue, York, Pa., 45 x 52 ft. Rianhard Dempwolf, Cassett Building, is architect.

The Keystone Carbonic Gas Co., Connellsville, Pa., recently organized, has acquired the plant of the Highspire Distillery Co., Highspire, Pa., for the manufacture of industrial gas. T. B. Donnelly is vice-president, and E. W. Powell, secretary, both of Connellsville.

The Dudley Watch Co., Orange and Queen streets, Lancaster, Pa., has awarded a contract to Herman Wohlsen, Woolworth Building, for a two-story factory, 23 x 100 ft., on South West End Avenue. Henry Y. Shaub, Imperial Building, is architect.

Buffalo

BUFFALO, Feb. 27.

The Atlas Vise Co., Inc., Lowville, N. Y., is planning for the erection of a new two-story factory to cost about $27,000. E. W. Fulton, Lowville, is president.

The H. H. Franklin Mfg. Co., Syracuse, N. Y., manufacturers of automobiles, has arranged an appropriation of $5,000,000 for a new plant to manufacture a light four-cylinder, air-cooled automobile. A site at Eastwood, near Syracuse, is being considered. The company is said to be negotiating for the purchase of the plant of the Willys Corporation, Elizabeth, N. J., never entirely completed. With such acquisition the proposed Eastwood plant would be deferred. H. H. Franklin is president.

The Syracuse Twist Drill Co., Syracuse, N. Y., is planning to rebuild the portion of its plant recently destroyed by fire with loss estimated at about $20,000.

The Greene Machine Co., Watertown, N. Y., is planning for the erection of a new two-story machine shop to cost about $25,000. C. H. Greene is head.

The Johnson City Motor Car Co., Johnson City, N. Y., has awarded contract to H. B. Van Ness, Washington Street, Endicott, N. Y., for a one-story service and repair building, 72 x 115 ft.

The United Fertilizer & Lime Co., Merchants' Bank Building, Syracuse, N. Y., is planning for the installation of new crushing and screening machinery at its plant at Gouverneur, N. Y.

The National Lamp Works, 1495 Fillmore Avenue, Buffalo, has filed plans for a machine shop to cost $15,000.

Fire, Feb. 17, damaged the plant of the McKaig-Hatch Co., 1590 Niagara Street, Buffalo, maker of tools and drop forgings. The loss is estimated at $30,000.

Cleveland

CLEVELAND, Feb. 27.

Machine tool sales fell off the past week. Inquiries are holding up fairly well, but practically all that came out during the week were for single machines. Plant operations in the metal-working industries show a slight gain and the sentiment is better than for some time. Cleveland foundries are operating on an average of about 30 per cent as compared with the low point of about 20 per cent reached last year. Some of the recent buying has been from comparatively new industrial concerns that had not provided all the equipment they expected to install when the slump came a year ago and which shut off on additional purchases at that time. Some additional machine tool business is looked for from this source shortly.

Demand for used machinery picked up with some dealers during the week. In used machinery one local dealer reports the sale of four single spindle drilling machines to a northern Ohio manufacturer and four lathes, a shaper and drilling machine for equipping a Chicago shop.

Inquiry for hydro-electric equipment shows improvement. There is also better inquiry for locomotive cranes.

The Fostoria Welding Co., Fostoria, Ohio, a new company, has established a plant at 319 North Main Street. A. W. Zenz is the principal owner.

The India Machine & Rubber Mold Co., Akron, has purchased the plant of the Vulcan Welder Co. in that city and will move into its new quarters shortly.

The Sandusky Gas & Electric Co., Sandusky, Ohio, will enlarge its plant. Additional equipment to be installed will include boilers, turbines and coal and ash handling equipment.

It is reported that the Wells Process Co., Conneaut, Ohio, will build a one-story machine shop, 66 x 130 ft.

The Standard Body Co., Angola, Ind., will establish a plant in Hicksville, Ohio, for the manufacture of motor truck bodies. It has acquired a lease of the Goller factory and is installing equipment.

The Lucius Mfg. Co., Uhrichsville, Ohio, has completed and placed in operation its plant for the manufacture of welded tanks for automobile and other uses. The officers are J. E. Smith, president; Alexander Robinson, vice-president; C. E. Lucius, secretary and manager; John L. West, treasurer.

The United States Street Sweeping Machine Co., Akron, Ohio, has been incorporated to manufacture patented street sweeping equipment. Offices have been opened at 712 Second National Bank Building, Akron.

The Interstate Aluminum Co., Canton, Ohio, which recently increased its capital stock from $25,000 to $50,000, plans to enlarge its works and install new equipment.

The D. Connelly Boiler Co., Cleveland, has taken an order from the San Joaquin Light & Power Co., Los Angeles, Cal., for six 850-hp. water tube boilers.

Cincinnati

CINCINNATI, Feb. 27.

At least two fair-sized orders were placed the past week in which local manufacturers participated. The Franklin Motor Co., Syracuse, N. Y., closed for approximately 30 machines, many of which were booked in this market. The General Electric Co. was also a buyer for its Lynn, Mass., plant, and local manufacturers were also well represented in this deal. The Santa Fe closed for several tools, among them a large planer. A Cincinnati manufacturer was also a purchaser, buying about $10,000 worth of equipment. The Chesapeake & Ohio is reported to have bought a number of used tools from the Hog Island shipyards and it is said that the Hocking Valley Railroad, which recently inquired for seven machines, will likely fill its requirements from the same source.

Some manufacturers have quoted on more inquiries the past two weeks, while others state the market is much quieter than for some months past. The market can well be classed as "spotty," but the majority of manufacturers are of the opinion that the general position of the industry is much improved. Some large lists of high-grade used tools are coming out and an analysis shows that tools classed as 95 per cent new are being offered at approximately 55 per cent of to-day's list prices. On smaller tools some low prices are being made by dealers, in one instance an 18-in. x 8-ft. engine lathe, with full attachments, being offered at $600 and an intimation made that this price could still be shaded considerably. A 14-in. x 8-ft. engine lathe with full attachments is being offered at $400. Prices on heavier machines, however, are holding firm and local manufacturers are refusing to make any concessions on even the most attractive business.

The Midwest Engine Co., Indianapolis, Ind., is being reorganized as the Midwest Engine Corporation. Howard S. Mott, New York, is the chairman of the new corporation and Oscar E. Stevens, New York, secretary.

The Globe Register Co., Reading Road, Cincinnati, has placed contract with the Ferro-Concrete Construction Co. for a two-story addition which will increase its manufacturing facilities 50 per cent. The present plant is a three-story structure and two additional floors will be added.

The Hamilton, Ohio, plant of the Ford Motor Co., which has been engaged in tractor production, has been turned into a wheel manufacturing plant and is now turning out 300 sets a day. It is understood that the plans of the company call for an increase in the output until the entire production of 4000 sets a day are made. The plant also manufactures locks for touring cars, 4500 a day being the present capacity.

Detroit

DETROIT, Feb. 27.

The Stafford Roller Bearing Co., Lawton, Mich., has awarded contract to Benjamin Barnhart, Lawton, for a new one-story plant. L. K. Stafford is president.

The Detroit Edison Co., Detroit, is arranging an appropriation of $3,000,000 for extensions and improvements in electric generating plants and system during the year.

A vocational department will be installed in the new high school to be erected at Rockford, Mich., for which bonds for $100,000 have been voted.

The Big Rapids Electric Co., Big Rapids, Mich., will build an addition to its generating plant and install new equipment. W. A. Stillwell is secretary.

The Gangnier Stereotype Foundry Co., 525 Heward Avenue, Detroit, will take new bids on revised plans for its one-story factory, 30 x 200 ft., estimated to cost about $50,000.

Edmond Gangnier is president. Kasurin Brothers, 512 Empire Building, are architects.

C. Chatfield, Escanaba, Mich., is organizing a company to build and operate a foundry at Iron Mountain, Mich., for the manufacture of iron, brass and other metal castings. A site has been selected.

The Egyptian Portland Cement Co., Port Huron, Mich., is completing plans for remodeling the former shops of the Grand Trunk Railway Co., recently acquired, for the establishment of a new cement manufacturing plant.

The National Portland Cement Co., Mt. Pleasant, Mich., is planning to break ground early in April for its new works at Coldwater Lake, to comprise a main two-story mill, with several one-story buildings, estimated to cost about $500,000, including machinery. H. C. Shields is general manager.

The Dail Steel Products Co., Lansing, Mich., is arranging to extend its production and will soon commence the manufacture of steel toys.

Milwaukee

MILWAUKEE, Feb. 27.

Machine tool trade in February is generally regarded as equal in volume to either December or January. The tone of business showed slight improvement over previous periods, although this betterment was noticeable more in the character and scope of inquiry rather than sales. Used tools continue to furnish strong competition to new equipment, especially where price is the determining factor. It is said that there still remains an enormous quantity of used tools to be worked off, although the supply is steadily being reduced. Improvement in the general position of metal-working industries continues to manifest itself with more certainty, if slowly.

The Prairie du Chien, Wis., Tool Co., manufacturer of mechanics' tools, grinders, etc., has increased its capital stock from $50,000 to $150,000 by a new issue of $50,000 common and $50,000 preferred stock. The proceeds will be used for the general development of the business, which contemplates enlargement of the facilities during the present year.

The Board of Education, West Allis, Wis., is asking bids for the construction of a west wing of the new high school building to be used exclusively for manual arts training. The cost of the addition, with shop equipment, etc., is estimated at $100,000. The architects are Robert A. Messmer & Bros., 221 Grand Avenue, Milwaukee.

The Argo Tool & Machine Mfg. Co., Milwaukee, has been incorporated with a capital stock of $25,000 to manufacture machinery, tools, mechanical specialties, etc. The incorporators are Charles A. Phillips, 383 Thirty-first Avenue; Charles E. Helm, 345 Twenty-fifth Avenue, and Arthur J. Huck, 809 Fortieth Street, Milwaukee, all of whom have been for many years connected with the West Milwaukee locomotive and car shops of the Chicago, Milwaukee & St. Paul Railway Co. as shop superintendent.

William Trachte, Watertown, Wis., has plans for a garage, sales and service building, 56 x 100 ft., part two stories and basement, to be erected at Third and Jefferson streets for the occupancy of the Klinger Buick Agency. It is to cost about $25,000 and be ready May, 1.

The Board of Education, Chippewa Falls, Wis., will close bids March 27 on the construction and equipment of a junior high and vocational training school, to cost $175,000. The architect is E. J. Hancock, Eau Claire, Wis. It will contain machine, plumbing, automotive and other manual arts shops.

The Svoboda Altar Works, Kewaunee, Wis., manufacturer of church furniture, fixtures, etc., has purchased a two-acre site for a new factory which it will build in units, the first to be undertaken immediately. It will be of brick, 60 x 125 ft., part two stories. Current will be purchased. Considerable new wood and metal-working equipment will be purchased to supplement the equipment of the present factory. Joseph Svoboda is proprietor.

The Jacobsen Auto Co., 1713 West Sixth Street, Racine, Wis., will build a new public garage with display rooms and machine shop, 85 x 102 ft., one-story and basement, to cost about $30,000. William J. Redden, local architect, is in charge.

The Mar-Tan Motor Mfg. Co., Milwaukee, has been granted a charter to manufacture engines, motors, machinery, etc. The capital stock is $125,000 and the incorporators are A. E. Martin, W. L. Tanhauser and H. E. Winkle, 78 Loan & Trust Building, Milwaukee. A definite statement of plans will be made later.

The Board of Education, Sheboygan, Wis., will take bids after March 15 for the construction of the second unit, or continuation school department, of the new $1,250,000 high school, designed by Childs & Smith, architects, Chicago. Bids for the manual training equipment probably will not be asked before May 1.

J. M. Osborn, Waupaca, Wis., will start work about April 1 on the construction of a public garage and repair shop, 58 x 100 ft., two stories and part basement. It will cost about $37,000, including equipment.

The J. W. Bithrong Sheet Metal Co., Waukesha, Wis., has been organized by J. W. Bithrong, who has leased the building at 139-141 West Broadway and will purchase some new equipment to supplement that acquired from the Perkins Hardware Co., with which concern he was connected for fifteen years.

The Board of Education, Ashland, Wis., is calling for bids for the construction of the Latimer Memorial manual arts training school, estimated to cost $120,000. It will be two stories, 65 x 122 ft., and is to be ready for the opening next September.

The Nordberg Mfg. Co., Milwaukee, has taken a contract to build two 13,000-hp. steam engines for a rolling mill at Steubenville, Ohio, at a price said to be approximately $500,000, for delivery in about a year. The engines will be of special design and are said to be the largest units of the kind ever built in this country.

Pittsburgh

PITTSBURGH, Feb. 27.

Inquiries for machine tools still are more numerous in this district than orders and the trade derives most of the cheerfulness shown from the somewhat better operation of steel plants. Purchases of individual tools are constant enough, but they do not run into very large values. Prospective buyers who have issued lists are moving slowly about closing. Seemingly, there is not much urgency for the tool sought or it is possibly believed that a little delay will bring more favorable quotations. The P. H. Murphy Co., New Kensington, Pa., recently closed for several presses, the business being divided by the E. W. Bliss Co., Brooklyn, and the Toledo Machine & Tool Co., Toledo, Ohio. These were double-turn presses with 8-in. shafts. This company is doing nothing at present in connection with equipment for the Pressed Steel Mfg. Co., Chicago, a subsidiary plant. The Westinghouse Electric & Mfg. Co. will probably close soon for some additional tools for its Springfield, Mass. plant, which is busy on radio apparatus.

The crane market does not show much life, although manufacturers' representatives are getting a fair number of inquiries. The Ellwood City Forge Co., Ellwood City, Pa., has closed with the Northern Engineering Works, Detroit, for a 15-ton crane with 5-ton auxiliary, with 60 ft. span. The Northern Engineering Works also has taken a 1-ton hoist for the Pennsylvania Rubber Co., Jeannette, Pa. The Sharpsburg Foundry Co., Sharpsburg, Pa., has ordered a Shaw yard crane.

The Babcock & Wilcox Co., has taken the order for three Stirling boilers and superheaters for installation at the Carrie furnaces, Homestead, Pa., works of the Carnegie Steel Co. These boilers have a combined rating of 2500 hp. The West Penn Power Co. is expected to close shortly for two 30,000-kw. turbines and several boilers for its Windsor, W. Va., plant, and the West Leechburg Steel Co. for a new 16-in. electrically driven continuous strip mill, with necessary auxiliary equipment.

The National Supply Co. of Pennsylvania, 1304 Union Bank Building, Pittsburgh, manufacturer of oil well, water well and other equipment, is revising plans for its proposed two-story and basement building, 100 x 105 ft., at Delaware and Preble streets, estimated to cost about $50,000. J. H. Barr is president.

Jules J. Quertinmont, Point Marion, Pa., head of the Jeannette Window Glass Co., plans to construct a sheet glass works at Fairchance, Pa., estimated to cost in excess of $300,000, including machinery. Work will commence at an early date.

The Erie Railroad Co., 50 Church Street, New York, has arranged for the operation of its repair shops at Meadville, Pa., under the management of W. S. Schlafge, head of the mechanical department of the road, recently granted a leave of absence for this purpose. It will resume under full capacity at once, giving employment to more than 800 men.

The Granny Branch Coal Co., 70 Wall Street, New York, is planning for the installation of electrically operated mining machinery and other equipment, including motor cars, at its properties in the vicinity of Big Chimney, W. Va. Bids will be asked in the spring. Clark & Krebs, Charleston, W. Va., are engineers.

The Virginia Western Power Co., Alderson, W. Va., is disposing of a bond issue of $850,000, and will use more than one-half of the proceeds for extensions in its power plant, including new generating machinery. The company operates

a steam-turbo plant at Ronceverte, W. Va. Headquarters are at Clifton Forge, Va.

The receivership of the Jeffery-Dewitt Insulator Co., Kenova, W. Va., has been dismissed, and the plant and property returned to the officials. The company has been reorganized with a capital of $800,000 to manufacture high-tension insulators, etc., and is affiliated with the Champion Spark Plug Co., Detroit. R. A. Stranahan, president of the last noted organization, is head of the West Virginia company; J. F. Sinclair is general manager and will be in charge at the Kenova works.

A vocational department will be installed in the two-story and basement high school to be erected by the Wayne County Board of Education, Clarksburg, W. Va., estimated to cost about $180,000. Herman P. Dean is secretary.

A one-story power house addition will be erected by the Libbey-Owens Sheet Glass Co., Charleston, W. Va., at its plant at Kanawha City, W. Va., in connection with other extensions estimated to cost $200,000, including equipment.

C. E. Hines, Buckhannon, Pa., will build a one-story power house in connection with his proposed new wood-working plant.

The Gulf States

BIRMINGHAM, Feb. 27.

The Dallas Power & Light Co., Dallas, Tex., has made application for permission to make extensions in its power plant and system to cost about $167,000. C. W. Davis is general manager.

Thompson & Norman, Mexia, Tex., have completed plans for a new one-story machine shop at Marshall, Tex.

The Shreveport Foundry & Machine Co., Cedar Grove, La., has acquired property at Bossier City, La., and has plans under way for a new plant. It is proposed to remove the present works to the new location.

The Common Council, Wills Point, Tex., is considering tentative plans for the establishment of a municipal electric light and power plant.

The Petrous Mfg. Co., Chuluota, Fla., recently organized with a capital of $50,000, has plans under way for a two-story factory, 40 x 90 ft., to manufacture concrete brick and kindred products. The machinery installation will include a steam shovel for sand digging. The plant will have an initial daily capacity of about 30,000 brick. J. A. Rogers is secretary and treasurer and A. S. Nunamaker manager.

Fire, Feb. 20, destroyed a portion of the plant and machinery of the Hesse Envelope Co., Carter and Caruth streets, Dallas, Tex., with loss estimated at $100,000. George S. Otey is president.

The Republic Power & Service Co., Breckenridge, Tex., is planning for extensions and improvements in the former plant of the Breckenridge Ice & Cold Storage Co., recently acquired, estimated to cost about $45,000, including equipment.

Fire, Feb. 15, destroyed the mechanical plant of the Griswold Oil Co., Wichita Falls, Tex., with loss estimated at about $25,000. It will be rebuilt.

The Texas Power & Light Co., Dallas, Tex., is considering tentative plans for its new central generating plant at Denison, Tex., which has been held in abeyance. The company is operated by the Electric Bond & Share Co., 71 Broadway, New York.

John P. King and E. P. Maddox, Fort Worth, Tex., have organized a company to build a one-story ice manufacturing plant at Arlington, near Fort Worth, to cost $40,000. James Davis, Arlington, is also interested in the new organization.

The Frost-Johnson Lumber Co., Shreveport, La., has acquired timber properties in the vicinity of Monroe, La., for about $60,000, and has tentative plans for the erection of a new lumber mill near Bastrop, La.

The city manager, G. H. Cairns, Gainesville, Fla., will install a new turbo-generator set, switchboard and other equipment at the municipal power plant. Bids are being asked. Robert & Co., Red Cross Building, Atlanta, Ga., are engineers.

Baltimore

BALTIMORE, Feb. 27.

The Boston Iron & Metal Co., Pratt and Fremont streets, Baltimore, has acquired through its president, Morris Schapiro, the plant and property of the C. A. Gambrill Mfg. Co., Ellicott City, for $410,500. The new owner plans to utilize the property in connection with its business.

The General Machinery & Supply Co., Baltimore, has leased the three-story building at 411 Exchange Place, for local works and headquarters.

The Eastern Shore Gas & Electric Co., Salisbury, Md., has arranged for a bond issue to total $703,000, a portion of the proceeds to be used for enlargements to the electric generating plant at Laurel, including the installation of a 2500-kw. turbo-generator and auxiliary equipment. Edwin E. Zimmerman is secretary and treasurer.

The United States Engineer Office, Wilmington, Del., will take bids until March 20 for a complete pumping unit, consisting of centrifugal pump and engine, piping, etc., for use at Cheasapeake City, Md. The unit is to have a daily capacity of 50,000,000 gal. of water, with alternate estimates to be received covering electrically-operated equipment, oil and steam-operated.

The Norfolk & Western Railroad Co., Roanoke, Va., has preliminary plans under consideration for enlargements in its car and locomotive shops at Hagerstown, Md.

John H. Geis & Co., Brooklyn, Baltimore, will take bids in March for a one-story planing mill, 65 x 100 ft., estimated to cost about $32,000, including machinery. William A White, 2024 North Smallwood Street, is architect.

The American Locomotive Co., 1301 North Boulevard, Richmond, Va., is planning for the erection of a one-story brass foundry, to cost about $16,000.

The Bureau of Supplies and Accounts, Navy Department, Washington, will take bids until March 7 for 9000 ft. of plow steel wire rope for the Norfolk Navy Yard.

The Jarvis Storage Battery Co., Winston-Salem, N. C., has filed plans for a one-story factory, 72 x 100 ft. J. C. Jarvis is president.

An ice-manufacturing plant to cost about $60,000 will be constructed by the American Cone & Pretzel Co., Macon, Ga. Plans have been completed.

The office of the Chief of Air Service, United States Army, Washington, will take bids until March 30 for seamless annealed copper tubing.

A vocational department will be installed in the two-story and basement high school at Charlotte, N. C., estimated to cost $100,000. C. C. Hook, Trust Building, is architect.

The Hiddenite Quarry Co., Concord, N. C., is planning for the construction of a new rock crushing plant at Hiddenite, N. C., with screening and sorting departments. It will have a capacity of about 1000 tons a day. E. V. Correll is manager.

The White Provision Co., Atlanta, Ga., has plans under way for the erection of a one-story power house, cold storage and refrigerating plant, and will call for bids soon.

The Lansing Lumber Co., Lansing, N. C., recently organized with a captal of $100,000, will call for bids early in March for planing mill and wood-working machinery for a new plant, 60 x 80 ft. V. E. Ballou is secretary and manager.

The Pacific Coast

SAN FRANCISCO, Feb. 21.

The Los Angeles Automotive Co., Los Angeles, will break ground at once for its new one-story automobile manufacturing plant, 71 x 252 ft., at 1020 Towne Avenue, estimated to cost about $100,000, including equipment. The Moran Co., 206 Kerckhoff Building, has the contract.

M. Elsaser, Oakland, Cal., care of S. Heiman, 57 Post Street, San Francisco, architect, is completing plans for a one-story machine shop, 75 x 100 ft., at Fourth and Washington streets, Oakland, to cost about $18,000.

Knox & Stout, 522 North Main Street, Santa Ana, Cal., have awarded contract to Ross & Ritchie, Long Beach, Cal., for a one-story automobile service and repair works, to cost $65,000.

A vocational school will be constructed by the Board of Education, Glendale, Cal., in connection with the group of high school buildings, plans for which are being prepared, estimated to cost in excess of $600,000. John C. Austin, 1125 Baker-Detwiler Building, is architect.

The Power Implement & Machine Works, Modesto, Cal., are having plans prepared for new works on property recently acquired on San Fernando Road, Glendale, Cal., consisting of a main one-story shop, 40 x 200 ft., and adjoining structure, 25 x 125 ft., estimated to cost about $30,000. Henry E. Bean, Central Building, Los Angeles, is architect.

The Pacific Gas & Electric Co., 445 Sutter Street, San Francisco, is arranging for an expenditure of $1,670,000 during the next 24 months for extensions to its hydroelectric generating plants.

Fire, Feb. 11, destroyed a portion of the plant of the Thomas Day Co., 725 Mission Street, San Francisco, manufacturer of electrical equipment and supplies, with loss estimated in excess of $250,000, including equipment.

The San Joaquin Light & Power Co., Fresno, Cal., will commence the immediate erection of an addition to its steam-operated electric generating plant at Buttonwillow, Kern County, to cost in excess of $1,000,000.

The City Council, Fallon, Nev., will take bids until

March 28 for a new electrically-operated pumping plant, including pumping machinery, motors, automatic control, tank, valves, piping, etc. The city engineer is in charge.

The Columbia Tire Corporation, Northwest Bank Building, Portland, Ore., will open bids early in March for its new two-story plant, 80 x 350 ft., on the Columbia Boulevard, estimated to cost about $85,000. R. A. Wurzburg is president.

The City Council, Canby, Ore., has plans under way for a municipal electric light and power plant.

The Consolidated Railway Equipment Co., Knott Street, Portland, Ore., is making inquiries for an overhead electric traveling crane, about 50-ft. span, 35-40 tons capacity.

The Long-Bell Lumber Co., Kansas City, Mo., is considering preliminary plans for a new mill in the vicinity of Kelso, Wash., estimated to cost in excess of $300,000 with machinery. R. A. Long is chairman of the board; F. J. Bannister is president.

The Common Council, Puyallup, Wash., has tentative plans under consideration for a municipal electric light and power plant.

The General Petroleum Corporation, 310 Sansome Street, San Francisco, is planning for extensions in its terminal plant at Harbor Island, Seattle, Wash., to cost about $100,000. The installation will include new steel tanks, pumping machinery, distributing equipment, etc.

The Central South

ST. LOUIS, Feb. 27.

The Chicago, Rock Island & Pacific Railroad Co., Chicago, has completed plans for a new coaling station at Booneville, Ark.

Fire, Feb. 23, destroyed the grinding plant of the Charleston Mining & Mfg. Co., near Mount Pleasant, Nashville, Tenn., with loss estimated at $150,000, including machinery.

The United Light & Power Co., Manhattan, Kan., has plans nearing completion for a one-story power house, 50 x 80 ft., at Downs, Kan.

Fire, Feb. 14, destroyed a portion of the plant of the Ardmore Nut Co., Ardmore, Okla., and adjoining works of the James Everett Machine Co., with total loss estimated at $100,000, including buildings and equipment.

The Common Council, Foss, Okla., has commissioned H. G. Olmstead & Co., Oklahoma City, Okla., engineers, to prepare plans for a municipal electrical light and power plant.

A vocational department will be installed in the two-story and basement junior high school, 120 x 215 ft., to be erected at Peabody, Kan., estimated to cost about $150,000. Mann & Gerow, Rorabaugh-Wiley Building, Hutchinson, Kan., are architects.

The Osage Power Development Co., P. O. Box 922, Lamar, Mo., W. R. Banks, manager, is perfecting plans for its new hydroelectric generating plant on Linn Creek, Camden County, with capacity of about 30,000 hp. A transmission system, over 100 miles long, will also be built. The entire project is estimated to cost in excess of $3,000,000.

The Kansas City Power & Light Co., Kansas City, Mo., will build a new one-story and basement power house, 50 x 140 ft., at 1110-12 Baltimore Avenue. H. C. Blackwell is manager.

A vocational department will be installed in a one-story and basement high school to be erected at Frederick, Okla., estimated to cost about $150,000. Tonnini & Bramblett, Terminal Arcade Building, Oklahoma City, Okla., are architects.

The Martin-Parry Corporation, York, Pa., manufacturer of automobile bodies, has leased about 20,000 sq. ft. at Kansas City, Mo., for the establishment of a branch assembling plant for commercial car bodies.

The Midland Metal Mfg. Co., 1219 Lydia Avenue, Kansas City, Mo., has filed plans for a one-story addition, 50 x 75 ft.

The Broderick & Bascom Rope Co., 4600 North Main Street, St. Louis, manufacturer of wire rope and cable, will rebuild the portion of its wire-stranding department, recently destroyed by fire with loss estimated at about $75,000, including equipment.

The Board of Water Commissioners, St. Louis, will construct a steam-operated power house in connection with extensions to the city waterworks, to include electric generator, exciter, engine, boiler and auxiliary equipment. A machine shop will also be built. The entire project will cost in excess of $1,000,000. Edward E. Wall is water commissioner in charge.

Fire, Feb. 19, destroyed a portion of the plant of the Commercial Car Co., Highland Park, Louisville, manufacturer of automobile bodies, etc., with loss estimated at $100,000, including equipment and stock.

IRON AND INDUSTRIAL STOCKS

Steel Shares Attracted Much Attention During the Past Week

Steel shares attracted much attention in the investment world. Industry, in general, is looking to the steel industry for an indication of prospective business. Increased steel mill operations, as well as renewed talk dealing with combinations of steel properties, have but accentuated public interest in steel shares. The strength of United States Steel common has been the outstanding feature the past week, establishing, as it has, new high records for this movement. Against the strength of Steel common there has been some liquidation in other steel shares, prompted by published and forthcoming annual statements. Aside from the steel outlook, the continued strength of foreign exchange is perhaps the most outstanding development.

The range of prices on active iron and industrial stocks from Monday of last week to Monday of this week was as follows:

Allis-Chalm. com.	44¼ - 45¼	Lackawanna Steel.	45⅞ - 48¾
Allis-Chalm. pf...	90¾ - 92	Midvale Steel.....	30 - 31⅝
Am. Can com.....	39⅝ - 41⅝	Nat.-Acme	10⅞ - 11⅛
Am. Can pf.....	98⅜ - 100	Nat. E. & S. com.	32½ - 40½
Am. C. & F. com.	146¾ - 150⅝	Nat. E. & S. pf...	— - 88½
Am. C. & F. pf...	120 - 120½	N. Y. Air Brake..	59¼ - 60¼
Am. Loco. com....	108⅝ - 111¼	Pittsburgh Stl. pf.	— - 88
Am. Loco. pf.....	— - 115¼	Press. Steel com..	64½ - 66¾
Am. Radiator com.	87 - 88	Press. Steel pf....	— - 92
Am. Steel F. com.	31½ - 33¼	Ry. Stl. Spg. com.	96 - 98¾
Am. Steel F. pf...	— - 93½	Replogle Steel.....	30½ - 32½
Bald. Loco. com..	105⅝ - 109¼	Republic com.....	46½ - 54½
Bald. Loco. pf....	106⅞ - 107½	Republic pf.....	74 - 86
Beth. Steel com..	58⅞ - 61	Sloss com.....	37½ - 41¼
Beth. Stl., Cl. B..	63 - 66	Sloss pf.....	75 - 75¾
Beth. Stl., 8% pf..	107 - 108	Superior Steel....	— - 30
Chic. Pneu. Tool..	65¼ - 69	Transue-Williams.	— - 34½
Colorado Fuel.....	25¾ - 27½	Un. Alloy Steel...	26⅝ - 27
Cruc. Steel com...	54½ - 62	U. S. Pipe com....	25½ - 26½
Cruc. Steel pf.....	80 - 82	U. S. Pipe pf.....	60½ - 62
General Electric..	150½ - 155⅛	U. S. Steel com...	90⅞ - 96½
Gt. No. Ore Cert..	35 - 36	U. S. Steel pf.....	116 - 116¾
Gulf States Steel.	67 - 74½	Vanadium Steel...	33⅞ - 38¼
Int. Har. com.....	85 - 92½	Va. I. C. & Coke..	— - 50
Int. Har. pf.....	106¾ - 107⅝	Westingh'se Elec.	54⅞ - 56¾

Lackawanna Steel Co. Loss

The Lackawanna Steel Co. for the year ended Dec. 31 reported a loss of $1,082,276 from operations, after taxes and maintenance, against profits of $10,674,345 in 1920. The net profit and loss deficit, after inventory adjustment and other charges, amounted to $3,384,876, against a surplus of $4,294,375 in 1920. Details of the report follow:

	1921	1920
Net earnings after providing for taxes, expenses, maintenance	*$1,082,276	$10,674,345
Interest on bonds and other obligations—		
Lack. Steel Co.	887,962	965,152
Subsid. Co.	147,916	157,066
	$1,035,879	$1,122,219
Balance	*$2,118,155	$9,552,125
Less—Appropriations:		
For extinguishment mines and invest.	$151,557	$300,008
For deprec. and accruing renewals..	1,378,176	2,127,421
	$1,529,734	$2,427,429
Balance of profit	*$3,647,889	$7,124,696
Less—Adjust. account of excess prov. for Fed. taxes and sundry res. less inventory revaluation adjust.	$263,012	*$2,830,321
Net profit and loss for year	*$3,384,876	$4,294,375

*Deficits.

Truscon Steel Co. Report

President Julius Kahn of the Truscon Steel Co., Youngstown, Ohio, informed stockholders at the yearly meeting in Detroit that business this year is at a rate 30 per cent above the corresponding period in 1921. The company's gross receipts last year aggregated about $10,000,000. At the end of the year it showed a deficit of $336,000 after all charges, depreciation and dividends.

Inventory writeoff and depreciation charge in 1921 totaled $980,000. Current assets as of Dec. 31 last were $3,661,228.84 and current liabilities $796,249.86, the latter item representing total obligations of the interest, other than cap-

ital stock. Current assets included these items—cash, $264,294.14; inventory, $1,830,813.64; bills receivable, $1,490,836.01, and investments and bonds $165,285.

During the year the company paid dividends at the rate of 7 per cent on its preferred stock and 11½ per cent on common. President Kahn said that unless conditions should prove worse than now anticipated he expected the company to earn its dividends this year.

Last year was the first in which the company lost money, attributed largely to depreciation in inventory valuation, occasioned by large stocks of raw materials on hand when cancellations started about a year ago.

National Enameling & Stamping Co. Elects New Directors

The management of the National Enameling & Stamping Co. at the annual meeting of its stockholders in Jersey City met with opposition in the form of a ticket against that put up by those in control. Under the leadership of Clement Studebaker, a ticket consisting of six new directors and ten old directors won over the management ticket by a vote of 130,512 to 77,719.

The six new directors elected are Clement Studebaker, J. W. Dougherty, former president of the Crucible Steel Co. of America; W. J. Maguire, J. S. Moran, Fred Orthwein, associated with the Busch interests of St. Louis, and W. B. Randolph. The following were re-elected, having received all the votes of the opposition: L. C. Bartling, G. V. Hagerty, G. W. Knapp, A. W. Niedringhaus, G. W. Niedringhaus, E. H. Schwartzburg, A. J. Kieckhefer, L. I. Niedringhaus, G. H. Niedringhaus and W. Howard Matthai. The directors who were defeated for re-election were H. W. Bartling, George W. Knapp, Jr., W. H. Matthai, Charles L. Wagandt, Solomon Richman, Robert D. Samuels.

The board re-elected G. W. Niedringhaus president and adjourned until March 2, when a reorganization meeting will be held and action taken on the common and preferred dividends.

Mr. Studebaker said after the meeting the election of his ticket did not indicate that there was any dissatisfaction with the present management. "It means that we are going to advocate a more active policy and develop to a greater degree the steel end of the business," he said. The election of Mr. Dougherty as a director is expected to be of assistance in this direction.

The report of earnings for 1921, made public at the annual meeting, showed an operating loss of $218,510, against a net profit of $5,183,927 in 1920. After depreciation, interest and other charges, there was a deficit of $1,258,615, against a surplus of $3,362,151; after payment of common and preferred dividends, the total deficit last year amounted to $2,894,123, against a surplus of $1,726,643 in 1920.

Railway Steel Spring Shows Deficit

The annual report of the Railway Steel Spring Co., shows net earnings from all sources of $1,551,635, in 1921, after deducting all operating expenses, depreciation, reserve for taxes, etc., as compared with a net of $3,435,350 in 1920. After dividends there was a deficit of $473,365, while in 1920 there was a surplus of $1,410,350.

The dividends on preferred stock amounted to $945,000 and on the common stock to $1,080,000. Surplus accounts was reduced from $12,942,354 to $12,468,990. The company has $1,432,601 in cash, $1,460,396 in accounts receivable, $7,877,162 in securities and investments and $2,405,781 in inventories. Accounts payable amount to $132,927. Total assets and liabilities are $41,233,262.

President Fitzpatrick told the stockholders that the railroads had purchased only moderate quantities of equipment and supplies in the last two years, and that these purchases should increase greatly during 1922. The regular quarterly dividend of 2 per cent was declared on common and 1¾ per cent on preferred stock.

The St. Louis office of the Chicago Flexible Shaft Co. is to be resumed March 1, in charge of J. J. Wittenburg, who has been with the Chicago office of the company for three years. The office, as heretofore, will be located in the Railway Exchange Building.

Owing to the continued high cost of materials entering into industrial plant construction, the Youngstown Steel Co., Youngstown, Ohio, is not likely to proceed this year with its proposed mechanical puddling plant at Warren, Ohio. Several years ago the company acquired a site at Warren and planned to proceed with its plant this year. The mechanical puddler which it will employ is the invention of E. L. Ford of Youngstown.

REPUBLIC'S REPORT

Large Deficit, Payment of Dividend on Preferred Stock Suspended

The quarterly dividend of 1¾ per cent due to be declared on the preferred stock of the Republic Iron & Steel Co. was passed by the directors last Thursday. Dividends at the rate of 7 per cent annually have been paid regularly since 1916. In that year and in 1917 payments exceeded 7 per cent owing to extra payments on account of accumulated dividends for previous years. Dividends on the common stock were passed last May. The company had paid at the rate of 6 per cent annually on that stock from the beginning of 1917 to last spring.

A statement issued by the company following the meeting said, in part:

"The board of directors has decided to suspend payments on the preferred stock until future earnings warrant resumption of dividend disbursements. As current operations are without profit and the future outlook for business is uncertain, it was the opinion of the board of directors that this action is to the interest of the stockholders."

The annual report for 1921 shows that the company did a gross business of $20,756,749, against $76,342,220 the year before. Total net income amounted to $685,120, against $14,174,164. After all charges, including interest and other deductions, there was a deficit of $5,665,242, against a surplus of $7,616,522 the year previous. The income account follows:

	1921	1920
Net earnings	$511,528	$13,825,522
Interest, &c.	173,482	348,642
Total income	$685,010	$14,174,164
Expenses, idle plants	1,494,130	.....
Loss	$809,120	*$14,174,164
Total deductions	4,049,148	5,819,674
Deficit	$4,858,268	*$8,354,489
Bond-note interest	806,974	737,967
Deficit	$5,665,242	*$7,616,522
Preferred dividend	1,750,000	1,750,000
Deficit	$7,415,242	*$5,866,522
Common dividend	450,000	1,800,000
Deficit	$7,865,242	*$4,066,522
Previous surplus	37,441,571	33,880,972
Surplus	29,576,329	37,947,494
Written off	.....	505,923
Final surplus	$29,576,329	$37,441,571

*Net profits and surplus.

On Dec. 31, 1921, the company reported unfilled orders on hand amounting to 67,731 tons of finished and semi-finished products and 23,839 tons of pig iron, against 162,906 tons of finished and semi-finished and 35,772 tons of pig iron at the close of 1920.

The general balance sheet on Dec. 31, 1921, showed inventories valued at $15,251,804, against $18,751,451 at the close of the previous year. Accounts receivable amounted to $3,686,145, against $8,869,442 and cash $1,292,437, against $1,443,752. Accounts and bills payable were $4,196,639, against $6,653,892, while reserves for depreciation totaled $12,675,924, against $11,901,170.

The report says:

"The operating results for the year ending Dec. 31, 1921, were decidedly the worst in our history, notwithstanding the company's growth with respect to diversity of product and facilities for economic manufacture. The outstanding feature of the business situation affecting operations was the general collapse in demand which occurred in the early part of the year, which situation became intensified during the second and third quarters of the year. Price declines occurred throughout the year on an increasing scale, but the fall in price was out of all proportion to cost reductions.

"General conditions affecting operating results can be best summarized by the statement that the tonnage shipped during 1921 decreased about 68 per cent as compared with the tonnage shipped during 1920, whereas selling prices for the principal iron and steel products, as tabulated by trade journal authorities, declined from the high point of 1920 approximately 50 per cent. Our total tonnage for the year was adversely affected by the unprecedented depression in the agricultural implement trade, and also by subnormal demands from the railroads, railway equipment trade and other construction enterprises, *using such heavy iron and steel products as bars, plates and shapes,* which products represent about one-half of our finishing capacity. In other departments of our business, such as sheets and tubular products, the demand was relatively better. As a result of this unbalanced condition of trade, our total production and

shipments for the year were only approximately 25 per cent of our normal capacity.

"The total earnings for the year ending Dec. 31, 1921, were $685,010.21, from which amount there was deducted on account of idle plant expenses, depreciation, inventory shrinkage and other miscellaneous items the amount of $6,350,252.35, and as a result the net loss for the year ending Dec. 31, 1921, was $5,665,242.14.

"Earnest efforts were made during the year to effect economies in all directions; common labor rates were reduced about 40 per cent, with relative adjustments in all other labor and salaries, and substantial reductions in other items of cost were also effected, but as price reductions were necessarily made before cost reductions were possible, operating losses followed; furthermore, the limited demand for our products made an economic operation impossible.

"Freight charges, a large item of cost in iron and steel (due to the fact that it requires five tons of inbound material for the production of one ton of outbound shipment) *were maintained throughout the year on a war basis*, these rates being about double pre-war rates; in consequence of this abnormal condition, freight charges now represent about 50 per cent of the cost for producing crude products of iron and steel, and until this blockade against further cost reductions is lifted by freight rate reductions, neither normal costs nor normal demand for iron and steel can be expected.

"In view of the liberal charges heretofore made for provisional funds, the board of directors were of the opinion that these charges for the year ending Dec. 31, 1921, should be reduced. Ample expenditures, however, were made for proper upkeep of the plants and property, and we are therefore in position to take advantage of any improvement in demand which may occur. In addition to these expenditures, over $3,000,000 was expended during the year, completing prior year's appropriations, for improvements and extensions to property and equipment, the most important items being increased sheet steel finishing capacity, and for additions to our Northern mineral properties.

"Dividend payments on the preferred stock of the company were continued throughout the year because the board of directors were of the opinion that accumulated surplus justified such payments. As a result of these various expenditures, working capital has been necessarily reduced, leaving, however, a balance of net quick assets as of Dec. 31, 1921, of $15,180,064.10. Reductions were also made in the surplus account, through the absorption of losses incurred and dividends paid, leaving the net balance Dec. 31, 1921, of $29,576,329.35."

Industrial Finances

The Ryan Car Co., Chicago, has increased its capital stock from $2,500,000 to $6,000,000 by the issuance of 35,000 shares of additionol common stock with par value of $100 per share. The new stock issued was distributed to the old common stock holders as a stock dividend. The company is merely capitalizing its assets. It is not contemplating any new extensions, as it has completed within the last year or so a large steel repair plant at Chicago.

The gross sales of the Transue & Williams Steel Forging Corporation for 1921 were $3,665,444, the net profits after charges and Federal taxes $43,138, and the deficit after $300,000 paid out in dividends $256,862. In 1920, the gross sales were $7,559,871, the net profits $670,734, dividends $500,000, and the surplus $170,734.

The net profits of the Wellman-Seaver-Morgan Co., Cleveland, for the year ending Dec. 31, 1921, after Federal taxes were deducted, amounted to $61,518, according to the statement presented at the annual meeting, Feb. 21. The company's surplus at the end of the year amounted to $770,467 as compared to $728,956 a year ago. Reports show that the company has no bank loans and is in a strong financial position, having $399,773 in cash on hand as against $269,691 on Dec. 31, 1920.

Plans of New Companies

The Automotive Accessories Corporation, Redford, Mich., has let contracts covering dies and an initial order of 1000 oil pans to the Detroit Stamping Co., Detroit. The new company states that whether it will install equipment has not been definitely decided.

The Brake Appliance Co., 3609 Gratiot Avenue, Detroit, is just getting into manufacture on a production basis, its product being the Simplex brake equalizer which applies the tension to both brake drums through the medium of a steel compression spring. It is claimed that this device eliminates the wearing jerk, causes instant response to the pressure of the foot upon the brake and obtains a safe, smooth stop under all conditions.

TRADE CHANGES

Negotiations have just recently been consummated whereby R. W. Monger, Elkhart, Ind., has purchased controlling interest in the Godfrey Conveyor Co. of that city. At the last meeting of the board of directors Mr. Monger was elected president of the company. Other officers elected were B. C. Godfrey, vice-president; D. H. Herbster, treasurer, and Chas. E. Clouse, secretary. The board of directors includes all officers of the company with James H. Channon, Chicago, and Fred W. Reid. At the meeting it was announced that the Godfrey Conveyor Co. would plan to occupy a greater place in the conveyor field than before and would aim to serve a wider field in supplying additional equipment now perfected and ready for the market. This new equipment includes the Godfrey standard car puller, which is designed to economically serve all general car moving needs, and Godfrey single drum hoists, which are destined to fill a great need among contractors and manufacturing plants.

L. Norris Hall, Inc., 940 North Front Street, Philadelphia, have just been appointed sales agents for the Philadelphia territory by J. W. Brainerd Steel Co., Warren, Ohio, manufacturer of patented hoops and rivets.

The George J. Hagan Co. has recently opened up offices in Detroit and Chicago. The Detroit office is located at 515 Murphy Building and is under the management of J. Sandberg, formerly of the General Electric Co. The Chicago office is at 20 East Jackson Boulevard and is under the management of V. A. Hain, formerly of the General Electric Co.

Frank E. Waddell and John Husband, for 15 years actively identified with the Consolidated Coke Co., Uniontown, Pa., and Pittsburgh, and the Pioneer Coal & Coke Co., Pittsburgh, have disposed of their holdings to George Whyel, Uniontown, Pa., and Charles F. Colbert, Jr., Pittsburgh.

The Norwalk Iron Works Co., South Norwalk, Conn., recently dissolved, was the old concern incorporated under the laws of Connecticut. The new company by the same name is incorporated under the laws of Delaware. The proceeding was simply a matter of form. The newly organized company announces the personnel of its executive staff as follows: C. L. Thompson, president and general manager; Howard E. Adt, first vice-president; Harold B. Knowles, treasurer and assistant secretary; Thomas M. Steele, secretary; A. R. Betts, vice-president in charge of sales; W. E. Mathews, vice-president in charge of manufacturing and engineering; G. W. Wardwell, chief engineer; W. M. Greene, general superintendent.

M. Samuel & Sons, scrap dealer, 1746 Woolworth Building, New York have opened a branch office at 1721 H street, N. W. Washington, which is in charge of DeNeal Samuel, a member of the firm.

The United States Cast Iron Pipe and Foundry Co. has opened a new office at the Interstate Building, Kansas City, Mo., which will be in charge of D. W. Pratt, sales agent.

The Cummings Machine Co., Minster, Ohio, has had its name changed to the Industrial Equipment Co.

The A. Z. Boyd Co., 126 Chambers Street, New York, has taken the New York agency for the sale of the line of screw plates made by the Russell Mfg. Co., Greenfield, Mass. It has had wide experience in selling these tools, having in the past been instrumental in building up the New York sales of one of the largest makers of screw plates.

The Spad Mfg. Co., Inc., has been incorporated for the purpose of manufacturing and distributing the Spad timer, a distributor for Ford cars. The company has gone into rather large production on this item and is solely occupied with its manufacture at present. Parts of this work are done under contract, such as brass automatic screw machine parts, pressed and rolled screw parts and rubber molding. Not wishing to confine itself for the entire future of the company to the manufacture of one item, the incorporation papers allow room for the fabrication of practically any devices in the automotive industry.

The International Lubricants Co., Ltd., Evanston, Ill., established 1914, has been incorporated and capitalized for $500,000, fully paid up, under the trade name of International Refining & Mfg. Co. W. O. Jeffery, president, has been in this line of business practically all his life, and the company can take care of domestic and foreign trade in its special lines of cutting lubricants, fibre, transmission and cup greases.

Butts & Ordway Co., Purchase Street, Boston, on March 11, will open a branch store at 68 Brookline Street, devoted exclusively to lines used in the garage and service station business, including a line of metal-working machine tools.

Current Metal Prices

On Small Lots, Delivered from Merchants' Stocks, New York City

The following quotations are made by New York City warehouses.

As there are many consumers whose requirements are not sufficiently heavy to warrant their placing orders with manufacturers for shipment in carload lots from mills, these prices are given for their convenience.

On a number of articles the base price only is given, it being impossible to name every size.

The wholesale prices at which large lots are sold by manufacturers for direct shipment from mills are given in the market reports appearing in a preceding part of THE IRON AGE under the general heading of "Iron and Steel Markets" and "Non-ferrous Metals."

Iron and Soft Steel Bars and Shapes

	Per Lb.
Bars:	
Refined bars, base price	2.53c.
Swedish bars, base price	10.00c.
Soft steel bars, base price	2.53c.
Hoops, base price	3.38c.
Bands, base price	3.13c.
Beams and channels, angles and tees 3 in. x ¼ in. and larger, base	2.63c.
Channels, angles and tees under 3 in. x ¼ in., base	2.53c.

Merchant Steel

	Per Lb.
Tire, 1½ x ½ in. and larger	2.50c.
(Smooth finish, 1 to 2½ x ¼ in. and larger)	2.70c.
Toe-calk, ½ x ⅜ in. and larger	3.20c.
Cold-rolled strip, soft and quarter hard	6.25c. to 7.25c.
Open-hearth spring steel	3.55c. to 6c.
Shafting and Screw Stock:	
Rounds	3.35c.
Squares, flats and hex	3.85c.
Standard cast steel, base price	12.00c.
Extra cast steel	17.00c.
Special cast steel	22.00c.

Tank Plates—Steel

¼ in. and heavier	2.63c.

Sheets

Blue Annealed

	Per Lb.
No. 10	3.28c. to 3.53c.
No. 12	3.33c. to 3.58c.
No. 14	3.38c. to 3.63c.
No. 16	3.48c. to 3.73c.

Box Annealed—Black

	Soft Steel C. R., One Pass Per Lb.	Blued Stove Pipe Sheet, Per Lb.
Nos. 18 to 20	3.55c. to 3.80c.	.....
Nos. 22 and 24	3.60c. to 3.85c.	4.10c.
No. 26	3.65c. to 3.90c.	4.15c.
No. 28	3.75c. to 4.00c.	4.25c.
No. 30	4.00c. to 4.25c.	.....

No. 28 and lighter, 36 in. wide, 10c. higher.

Galvanized

	Per Lb.
No. 14	3.85c. to 4.10c.
No. 16	4.00c. to 4.25c.
Nos. 18 and 20	4.15c. to 4.40c.
Nos. 22 and 24	4.30c. to 4.55c.
No. 26	4.45c. to 4.70c.
No. 27	4.60c. to 4.85c.
No. 28	4.75c. to 5.00c.
No. 30	5.25c. to 5.50c.

No. 28 and lighter, 36 in. wide, 20c. higher.

Welded Pipe

Standard Steel	Black	Galv.	*Wrought Iron*	Black	Galv.
½ in. Butt	—56	—40	¾ in. Butt	—30	—13
¾ in. Butt	—61	—47	1½ in. Butt	—32	—15
1-3 in. Butt	—63	—49	2 in. Lap	—27	—10
3½-6 in. Lap.	—60	—46	2½-6 in. Lap.	—30	—15
7-8 in. Lap	—56	—34	7-12 in. Lap	—23	— 7
9-12 in. Lap	—55	—33			

Steel Wire

BASED PRICE* ON NO. 9 GAGE AND COARSER	Per Lb.
Bright basic	3.50c. to 3.75c.
Annealed soft	3.50c. to 3.75c.
Galvanized annealed	4.25c. to 4.50c.
Coppered basic	4.00c. to 4.25c.
Tinned soft Bessemer	5.50c. to 5.75c.

*Regular extras for lighter gage.

Brass Sheet, Rod, Tube and Wire

BASE PRICE

High brass sheet	16¾c. to 17 c.
High brass wire	17 c. to 17¼c.
Brass rod	14¼c. to 14½c.
Brass tube, brazed	26 c. to 27½c.
Brass tube, seamless	18½c. to 19 c.
Copper tube, seamless	20¾c.

Copper Sheets

Sheet copper, hot rolled, 24 oz., 20¼c. to 21c. per lb base.

Cold rolled, 14 oz. and heavier, 2c. per lb. advance over hot rolled.

Tin Plates

Bright Tin Grade "AAA" Charcoal 14x20	Bright Tin Grade "A" Charcoal 14x20	Coke—14-20	Primes	Wasters
		80 lb.	$6.05	$5.80
		90 lb.	6.15	5.90
		100 lb.	6.25	6.00
IC	$10.00	$8.50	IC.. 6.40	6.15
IX	11.25	10.00	IX.. 7.40	7.15
IXX	13.00	11.50	IXX.. 8.40	8.15
IXXX	14.75	13.25	IXXX.. 9.40	9.15
IXXXX	16.25	15.00	IXXXX.. 10.40	10.15

Terne Plates

8-lb. Coating 14 x 20

100 lb.	$7.00
IC	7.25
IX	7.50
Fire door stock	10.00

Tin

Straits, pig	33c.
Bar	38c. to 43c.

Copper

Lake ingot	15 c.
Electrolytic	14¾c.
Casting	14½c.

Spelter and Sheet Zinc

Western spelter	6½c. to 7c.
Sheet zinc, No. 9 base, casks	10½c. open 11c.

Lead and Solder*

American pig lead	5¾c. to 6¼c.
Bar lead	6¾c. to 7 c.
Solder, ½ and ½ guaranteed	24c.
No. 1 solder	22c.
Refined solder	18c.

*Prices of solder indicated by private brand vary according to composition.

Babbitt Metal

Best grade, per lb.	75c.
Commercial grade, per lb.	35c.
Grade D, per lb.	25c.

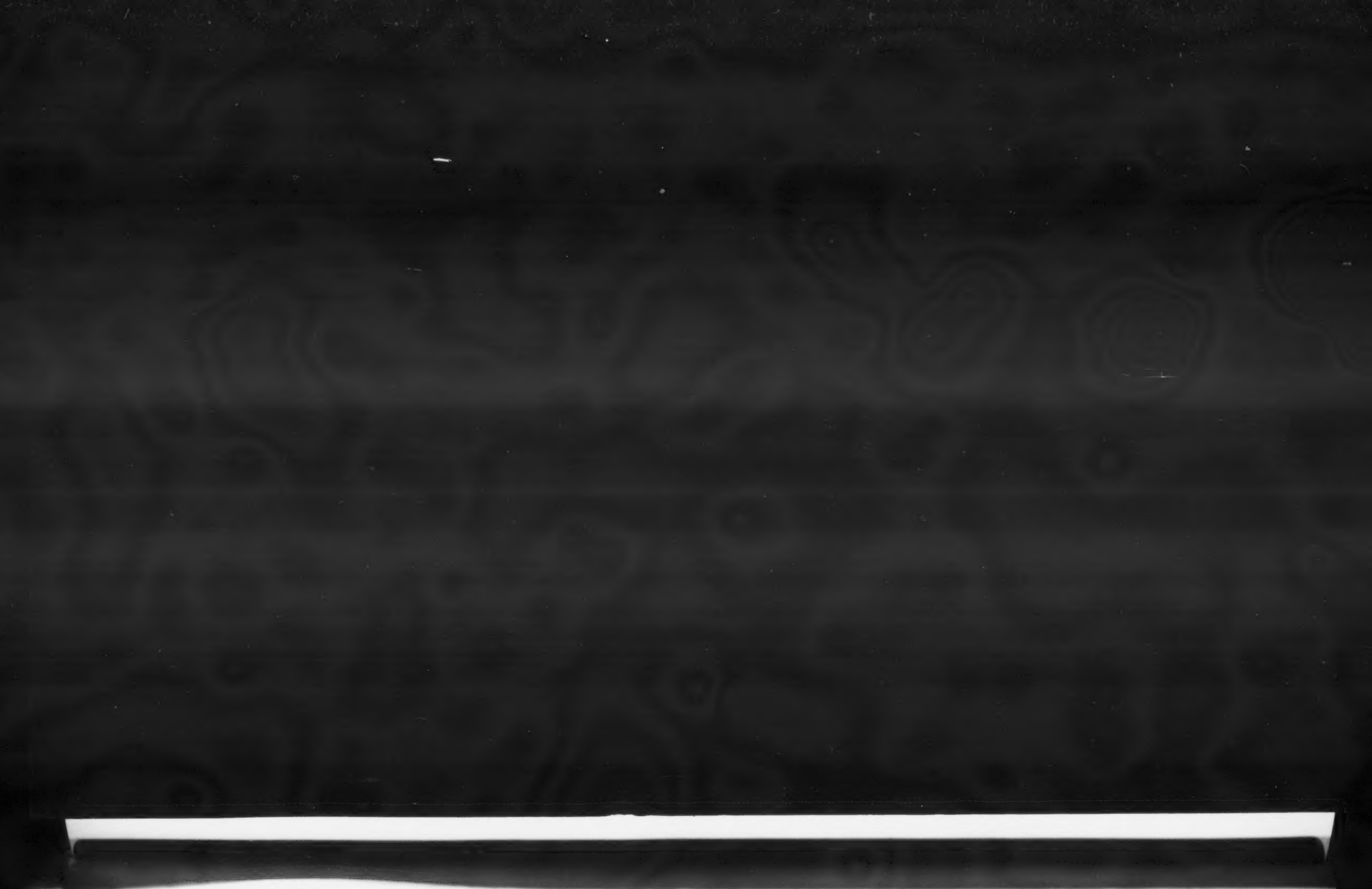
Antimony

Asiatic	5¾c. to 6c.

Aluminum

No. 1 aluminum (guaranteed over 99 per cent pure), in ingots for remelting, per lb.	26c. to 28c.

Old Metals

The market continues weak and transactions are hard to put through. Dealers' buying prices are nominally as follows:

	Cents Per Lb.
Copper, heavy crucible	10.50
Copper, heavy wire	9.75
Copper, light and bottoms	8.00
Brass, heavy	5.00
Brass, light	4.50
Heavy machine composition	7.25
No. 1 yellow brass turnings	5.00
No. 1 red brass or composition turnings	6.75
Lead, heavy	3.75
Lead, tea	2.50
Zinc	2.50